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MANUAL

OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

VOL. III.

TRITONIDÆ, FUSIDÆ, BUCCINIDÆ.

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In offering the Third Volume of the Manual of Conchology, I desire to express my sincere thanks for the very kind reception which the work has obtained from those interested in this and kindred pursuits, throughout the world. My constant endeavor is to perform my task in such a manner as will, in some measure, merit a continuance of their approbation.

The present volume includes monographies of the families Tritonidæ, Fusidæ and Buccinidæ, embracing a large number of familiar genera: a portion of them variable in specific characteristics and hence difficult of identification. I trust that the conservative view which I have adopted in treating these will at least facilitate their recognition.

I am under especial obligation to a number of correspondents who have manifested their interest in the Manual in a very pleasing way, by sending me (unsolicited, for the most part) specimens, drawings and critical observations upon the species. I shall be glad to continue to receive similar aid, and as a hint to those who are willing to furnish it, I would mention that, in addition to the three families mentioned above, material relating to the genera Nassa, Turbinella, Voluta, Mitra, Columbella, Marginella, Oliva, Ancillaria, Harpa and their allies will be very acceptable.

January, 1881. G. W. T., Jr.

Already *Triton* at his call appears
Above the waves, a Tyrian robe he wears ;
And in his hand a crooked trumpet bears.
The sovereign bids him peaceful sounds inspire,
And give the waves the signal to retire ;
His writhen shell he takes, whose narrow vent,
Grows by degrees into a large extent.

DRYDEN.

I have seen
A curious child, who dwelt upon a tract
Of inland ground, applying to his ear,
The convolutions of a smooth-lipp'd shell ;
To which, in silence hush'd, his very soul
Listen'd intensely, and his countenance soon
Brighten'd with joy : for murmurings from within
Were heard,—sonorous cadences, whereby,
To his belief, the monitor express'd
Mysterious union with its native sea.

WORDSWORTH.

MANUAL OF CONCHOLOGY.

Family TRITONIDÆ.

Shell with varices, which are either few and irregularly disposed (*Triton*) or form a continuous row crossing the whorls on opposite sides (*Ranella*). The number of varices does not exceed two to each whorl, whilst in *Murex* the smallest number is three. Operculum annular, with sub-apical or central nucleus. Mantle enclosed, siphon straight, foot small. Lingual membrane with teeth in seven rows (3-1-3), like the Doliidæ, etc. (The Muricidæ have the teeth 1-1-1). The dentition is illustrated on plate 2.

I have already stated the reasons which induce me to place the Tritonidæ in close connection with the Muricidæ, yet forming a passage to the Cassididæ and Doliidæ, rather than arrange them with the latter groups. See Vol. II, p. 67.

The Tritonidæ first positively appeared in the eocene strata; the genus *Spinigera* d'Orb., from the cretaceous, being now referred, more correctly I think, to the family Strombidæ, and *Trachytriton* Meek, also cretaceous, does not belong certainly to the family.

Synopsis of Genera.

TRITON, Montfort. Shell oblong; spire prominent, whorls with a few remote and non-continuous varices; columella rough or smooth; canal recurved, short or long; outer lip internally crenated or denticulated. More than a hundred recent species have been characterized.

DISTORSIO, Bolten. Shell subturreted; whorls distorted; aperture irregular, contracted, ringent; canal recurved; inner lip dilated, lamellar, rugosely plicated; columella excavated, verrucosely plicate; outer lip sinuous, internally plicate-dentate.

RANELLA, Lamarck. Shell ovate or oblong, compressed, with two rows of continuous varices, one on each side; aperture oval; columella arcuated and ridged, or crenulated; canal short, recurved; outer lip crenated.

There are over fifty recent species. In the lingual dentition (Pl. 2). *Triton* and *Ranella* are closely allied, but with a difference in the rachidian tooth; *Triton Cutaceum*, however, approaches *Ranella argus*. *Distorsio* (Pl. 2, fig 9.) is not sensibly different from *Triton*. The dentition of the family is unmistakably allied to that of the Cassididæ, Doliidæ, etc.

Fossil Genera.

The distinctness of the following groups is very doubtful.

RANELLINA, Conrad. The genus was never characterized. The type differs from the figure in the varices being partially disconnected, thus showing more affinity to *Triton* than to *Ranella*.

RANELLA MACLURII Conrad. Plate 3, fig. 14. *Tertiary; Claiborne, Ala.*

PERSONELLA, Conrad. Genus not characterized. Scarcely a *Distorsio*, but more like a *Gutturnium*.

DISTORSIO SEPTEMDENTATA, Gabb. Plate 3, fig. 15. *Eocene, Texas.*

TRITONOPSIS, Conrad. The type is a water-worn specimen, which Mr. Angelo Heilprin, who has examined the shell, declares to be too imperfect to assign to it any reliable characters. Has some resemblance to the section *Cabestana*, like *T. doliarium* L.

TRITON SUBALVEATUS, Conrad. Plate 3, fig. 30. *Eocene, Vicksburg.*

TRACHYTRITON, Meek. The generic character appears to be confined to the occurrence of *internal* varices, marking the former positions of the lip, and which have not been absorbed when growth recommenced; otherwise very like *Priene Oregonensis* = *cancellatus*. The want of a callus on the upper part of the columella, which Meek makes a distinguishing character from *Priene*, also characterizes the *P. Oregonensis*, young, as described by Mr. Redfield.

T. VINCULUM, Hall and Meek. Pl. 3, fig. 13. Cretaceous, *Dakotah.*

Genus **TRITON**, Montfort.

Animal of *T. Tritonis*, Linn., figured upon Plate 1 (Frontispiece). Details of the anatomy of the genus will be found in the introductory portion of Vol. II of this Manual, together with figures upon the 3d, 4th and 6th plates thereof.

Shell oblong, with generally prominent spire, the whorls crossed by a few remote and non-continuous varices; the columella

smooth or nodulous; the canal long or short; the outer lip crenated or denticulated within.

Operculum ovate, its growth annular either from a sub-apical or submarginal nucleus.

Whilst the lingual armature of *Triton* allies it closely with *Dolium*, etc., among the so-called tænioglossate mollusks, the affinities of the animal are on the whole closer, and those of the shell decidedly so, to Muricidæ.* It may be considered a connecting link between the two groups, but certainly cannot be safely removed from the vicinity of the latter, to which it is not only allied by its operculum (which is entirely different from that of *Dolium*), but so closely by the shell in some instances, that the assignment of the generic position is quite arbitrary.

The Tritons are distinctly tropical in distribution, no species inhabiting the colder seas. The species are numerous and beautiful, presenting a great range of variation in size and color; one species being almost the largest of gasteropod mollusks, attaining a length of one and a half feet, whilst others, belonging to the Epidromoid section, do not exceed a half inch in length. The cancellated forms are chiefly East Indian, and are dredged in sand in deep water; the West Coast of America group, covered with a rough epidermis, is obtained in sandy mud at from six to thirty fathoms' depth. A number of species have a world-wide distribution, which is doubtless due to their free-swimming or pelagic larvæ. These, unlike the Murices, but like the Purpuræ,† are very different at first from the adult both in animal and shell, undergoing a metamorphosis at a period subsequent to hatching.

I adopt the well-known name *Triton* in preference to the previously given *Tritonium* of Cuvier, believing that the interests of science are best conserved by keeping the nomenclature as stable as possible. *Triton* has been used in other departments of zoology, but so have many other generic names, which are nevertheless accepted without question. The fact is, that practical common sense has quietly shelved the British Association rule forbidding the use of a generic name in more than one branch of zoology. In these days only the very few enjoying

* See Vol. 2, Manual of Conchology, page 67.

† Vol. II, plate 8.

exceptional advantages can hope to acquire a competent knowledge of the names in use in a single department, and no one possesses the time or acquaintance with general zoology which would be necessary to avoid duplications. The alternative adoption of the name *Tritonium* has its difficulties: it is more generally known in connection with a Buccinoid group, and it is too close to Cuvier's genus *Tritonia*.

Reeve says*: The Tritons are shells of much more solid structure than the Murices or Ranellæ, and of much more simple growth. They are not furnished with any spines nor have they any ramified branches like the Murices; the rude manner in which the whorls are convoluted seem rather to indicate that their animal inhabitant, though possessing abundant power of calcification, is of somewhat sluggish growth. The epidermis of the Tritons is often remarkably thick, hairy and bristly, and is sometimes accompanied with small tufts of bristles. Another curious peculiarity in these shells is the structure of the apex; it appears in numerous instances to be formed of horny substance, thinly plated with shelly matter, and it is not an uncommon thing to find examples in which the calcareous plating is broken off so as to expose the horny cast underneath. The columella of the Tritons is generally covered with a bright coat of wrinkled enamel, and the outer lip becomes thickened in a manner exceedingly curious; upon arriving at maturity the lip curls under so as to form a deep, broad channel or gutter, and this is then filled up to form the thickened lip. The varices are all constructed in the same manner, each forming for a time the margin of the aperture; they are destined, it is conjectured, to protect the lip during a season of rest, and it would be extremely interesting if it could be discovered what length of time ordinarily elapses between the formation or deposit of the varix and the renewal of the operation of growth.

Mr. Arthur Adams† mentions the adaptation of the Trumpet-shell (*T. tritonis*) to the purposes of a tea-kettle by the inhabitants of the Typinsan archipelago, near the Loo-Choo Islands; the operculum forming the lid, the canal answering the purpose of a

* Conch. Icon., Vol. II, Triton, 1844.

† Narrative Voy. Samarang, I, 89.

spout, and the shell suspended by a wooden hook over the fire. Mr. Adams says that this rude vessel was adopted several times for the convenience of his party, and answered its purpose admirably.

The species of *Triton* being numerous, several attempts have been made to separate them into generic or subgeneric groups; the most successful being the arrangement of Messrs. H. and A. Adams. Two of these groups, however, *Simpulum* and *Cabestana*, are so closely related that I think Kobelt has very judiciously united them. *Priene* is the connecting form approximating *Triton* and *Ranella;* whilst in the latter genus species of the group *Lampas* recall *Triton*.

A very excellent catalogue of the genus has been published by Kobelt, the arrangement of which I mainly follow; adding, however, some additional species, making about one hundred and fifty in all. Kobelt has monographed the genus in Küster's Conchylien Cabinet and there are also monographies by Reeve and Kiener in their respective Iconographies.

Subgenera.

Simpulum, Klein. Shell fusiform, whorls nodosely ribbed; outer lip thick, plicate-dentate internally. Operculum with apical nucleus.

Cymatium, Bolten. Whorls triangular; aperture longer than the spire; outer lip dentated internally. Operculum with apical nucleus.

Gutturnium, Klein. Shell pyriform, subturreted, canal long, narrow. Operculum with submarginal initial point, near the middle of the inner margin.

Epidromus, Klein. Shell with long, generally curved spire; aperture small and canal very short. Operculum triangular, with submarginal nucleus.

Priene, H. and A. Ad. Shell ventricose, thin, cancellated or plicated; canal short. Operculum with apical initial point.

(*Typical.*)

Genus **TRITON**, Montf.

T. Tritonis, Linn. Pl. 1, fig. 1; pl. 3, fig. 16; pl. 4, fig. 25.

Whitish or yellowish, variegated with semi-lunar markings of chestnut or chocolate color; spire pink towards the apex; orange-red within the aperture; columella dark chocolate crossed by numerous white wrinkles or plaits; outer lip denticulated at the

margin, each denticle terminating a double revolving band of red-brown, or chocolate color. Length, 16 inches.

Isle of Bourbon, Philippines, New Zealand, Polynesian Islands. Japan, Indian Ocean.

Var. NOBILIS, Conrad. Pl. 4, figs. 21, 26.

Usually heavier and shorter than the typical form, the whorls with a distinct shoulder; color within the aperture lighter.

Sicily, So. Coast of Spain, Portugal, Cape Verd Isles, West Indies.

Conrad considers this a distinct species, and Aradas and Benoit have also described it, from the Mediterranean under the name of *T. Seguenzæ* (pl. 4, fig. 26); but the numerous specimens before me enable me to satisfactorily connect the two forms. The hump appears to become gradually more prominent with age, as in half grown specimens it is not apparent either in Mediterranean or West Indian specimens.

T. NODIFERUS, Lam. Pl. 1, figs. 2, 3; pl. 3, fig, 17; pl. 4, fig. 23.

White, clouded and painted with reddish brown; aperture white within; lip margin painted with brown; columella with white plaits, of which the posterior one is very prominent.

Length, 5 to 10 inches.

Mediterranean, Atlantic Coast of Europe, British Channel, Canaries, Natal, Mauritius, Japan, Australia, New Zealand.

T. Sauliæ, Reeve (pl. 3, fig. 17), and *T. australis*, Lam. (pl. 4, fig. 23), are generally considered at least varieties of this species, but I am unable to give them any permanent differential characters. The species varies in much the same manner as *T. Tritonis* in the smoothness or nodulation of surface, length of spire, etc. It is found fossil, commencing with the miocene, at several localities in southern Europe. The most northern European locality is the island of Guernsey, where three living specimens were trawled at different times between 1825 and 1832. Madame Power found this animal capable of reproducing amputated tentacles, etc. The Sicilians and Algerians eat the mollusk and esteem it a delicacy. At Nice, the fishermen and country people make a hole in the apex of the spire and use the shell as a trumpet which, Vérany remarks, produces a braying sound. It is an indispensable instrument in the old-fashioned charivari, which he describes as a deafening serenade to signalize the marriages of ill-assorted or unpopular couples.

T. SUBDISTORTUS, Lam. Pl. 3, fig. 18.

Whitish, maculated and spotted with reddish brown; white within the aperture. Length 2 to 2.5 inches.

Australia.

T. BASSI, Angas. Pl. 3, fig. 20.

The revolving riblets and tuberculations appear to be proportionally smaller than in the preceding species, and the denticulations of the lip-margin are described and figured as "close." The color does not differ from that of *T. subdistortus*, and I think it will prove to be synonymous with that species.

Length 1.08 inch.

Bass' Straits, Australia.

T. fraterculus Dunker appears, from the description (not figured) to be a synonym.

T. FUSIFORMIS, Kiener. Pl. 4, fig. 22.

The whorls have two or three large knobs between the varices and the entire surface is covered with very fine, close, revolving striæ, which are composed of minute, oblong granules. Yellowish brown, articulated with darker brown; aperture white within.

Length 1.5 to 2 inches.

Australia.

Subgenus **Simpulum**, Klein.

T. OLEARIUM, Linn. Pl. 3, fig. 19; Pl. 4, fig. 24; Pl. 5, figs. 27–29; Pl. 6, fig. 37.

Light brown, the varices and lip usually tesselated with chocolate, the columella frequently chocolate between the whitish plications; within the aperture flesh color. Variable in its proportions, the spire being sometimes short, in others longer. Frequently, the revolving ribs are partially separated into approximate pairs by an incised line; sometimes they are partially broken up into revolving series of granules. When the shell is fresh it is covered by a thin epidermis which, at frequent intervals, develops longitudinal, reflexed ridges terminating, upon their entire length, in long, hair-like digitations. Operculum with terminal initial point. Length, 2 to 6 inches.

Mediterranean Sea; Atlantic Coast of Europe and Africa; Canary and Cape Verd Isles; St. Helena; West Indies to Brazil; Polynesia; Australia; New Zealand; Japan.

The animal is of a light straw-yellow, covered with black spots, which become distant and larger upon the head; tentacles long and black. The name *olearium* Linn, appears in the 12th edition to apply here partially, but it is not the *olearium* of the 10th edition nor of Born nor Gmelin. It is the *Murex costatus* of Born (not Gmelin), and *parthenopus* of von Salis. The current identification of the Linnean name is so well established that, however ill it may accord with fact, it seems preferable to retain it.

T. PILEARIS, Linn. Pl. 6, figs. 31–36; Pl. 7, figs. 38–39.

Yellowish brown, with occasionally darker (and sometimes white) revolving bands; aperture and columella orange-red to blood-red, with white plications; epidermis thin, hairy and bristly, light olive color. Length, 2 to 5 inches.

Red Sea, Seychelles, Natal, China, Japan, Australia, Philippines, Sandwich Isles, Florida, West Indies, Brazil.

Kobelt distinguishes *T. Martinianus* (=*Veliei* Calkins, fig. 36). *T. aquatilis* Reeve, (fig. 34), and *T. intermedius* Pease, (fig. 35), as varieties; but I cannot so regard them, as I find no characters by which to separate them. *T. vestitus* Hinds, (figs. 38, 39), from the west coast of Central America, has normally, a shorter spire and more inflated body-whorl, is smoother, darker in color, the lip and columella between the plications dark chocolate; yet the intermediate stages between this and the typical *pilearis* make a continuous series.

T. RUBECULA, Linn. Pl. 7, fig. 40.

Lemon to orange color, or orange-red, with a light lemon or white revolving band on the middle of the body whorl, and white blotches on the varices; lip and columella same color as outer surface, with the plications white. Length, 1 to 2 inches.

Red Sea; Nicobar Isles; Philippines; Central Pacific; Sandwich Isles; St. Thomas, W. I.

The last locality is upon the authority of a dredged specimen in the Swift Collection, now in the museum of the Philada. Acad. For this specimen Mörch made a variety *occidentale*, but it has no distinctive characters.

T. GEMMATUS, Reeve. Pl. 7, figs. 41–44.

Whitish to orange-yellow. Revolving ribs fewer in number than in *T. rubecula*, with three revolving striæ between each rib—of which the middle one is largest; frequently laticed by longitudinal ribs, and sometimes developing two or three nodules between the varices. Length, 1 to 1·5 inches.

Philippines to Sandwich Islands; Paumotus.

More graceful in form, with more rapidly accuminated spire and longer canal, and smaller than *T. rubecula*;—to which, nevertheless, it is closely allied. *T. mundum* Gould, (figs. 43, 44), appears to be the same species.

T. FICOIDES, Reeve. Pl. 7, fig. 46.

Fig-shaped; yellowish, the lip and columella orange color. Length, 2 inches.

West Africa.

T. CHLOROSTOMUS, Lam. Pl. 7, figs. 47, 48.

White, more or less tesselated with red or chocolate spots, the revolving, incised lines usually colored; aperture deep orange within. Length, 1·5 to ·3 inches.

Red Sea; Isle of Bourbon; New Caledonia; Philippines; Central Pacific; Sandwich Islands; West Indies.

T. CORRUGATUS, Lam. Pl. 8, fig. 49.

Whitish, more or less stained and marked with brown; epidermis brown, pilose. Length, 2·5 to 3·5 inches.

Mediterranean; Atlantic coasts of France, Portugal and Spain.

Var. KREBSII, Mörch. Pl. 8, fig. 50.

Spire shorter, nodules between the varices stronger.

St. Thomas, St. Croix, W. I.

Described as a distinct species but the characters by which Mörch distinguishes it are common to the type form except the shorter spire and more rugose longitudinal ribs. Probably not perfectly acclimated, and depauperate in consequence.

T. BECCARII, Tapparone-Canefri. Pl. 7, fig. 45.

Light yellowish; aperture orange color. Length, 1·75 inches.

Massaua; Red Sea.

A single specimen only obtained. Its very narrow form will distinguish it at once from the nearly related species.

T. LINEATUS, Brod. Pl. 8, fig. 51.

Yellowish brown, the raised revolving lines chestnut-brown; columella and aperture chocolate, the plications white.

Length, 2·25 inches.

Galapagos Isles, in sand; 6 fathoms.

T. GRANULATUS, Dunker.

An unfigured species, 35 mill. in length, from Bass' Straits, Australia. Said to belong to the group *Simpulum*. I cannot indentify it.

T. CONTABULATUS, Anton.

Unfigured and not identified; placed by the author in his "*pileare*" group.

T. LIROSTOMUS,
T. PAPILLOSUS,
T. TRINGA,
T. NODILIRATUS,

Described by Mr. Arthur Adams in Ann. Mag. Nat. Hist. 1870. All from Japan. No figures, dimensions, nor comparative characters are given; so that I am unable to give an opinion as to their novelty.

*** Group *Linatella*, Mörch.

The species of this group approach more nearly to the Doliidæ in form and sculpture than any other Tritons.

T. TRANQUEBARICUS, Lam. Pl. 8, figs. 52, 53.

Light yellowish brown, the revolving ridges chocolate-brown; whitish within. Length, 1·25 to 2 inches.

W. Coast Africa; West Indies.

T. POULSENII, Mörch. Pl. 8, fig. 54.

Thin, inflated, orange-brown; white within the aperture; lip-teeth orange color. Length, 2 inches.

West Indies.

Two specimens in the Swift Cabinet (Mus. Philad. Acad.). It is possibly a variety of *T. cingulatus*, although much more inflated and with shorter canal than the typical form of that species. Very much like the genus *Dolium* in its general appearance.

T. CINGULATUS, Lam. Pl. 8, figs. 55, 56.

Light yellowish brown, with the revolving ribs darker; slightly shouldered and tuberculate on the angle; canal rather long and recurved. Length, 2 to 2·75 inches.

Philippines; Floating dock, *St. Thomas, W. I.* (Swift Coll.).

T. Voigtii, Anton (fig. 56) is a synonym, according to Philippi, who publishes the first and only illustration of that species.

T. WIEGMANNI, Anton. Pl. 9, fig. 57.

Whorls decidedly shouldered, and nodulous on the angle of the shoulder. Yellowish brown, the revolving ribs darker in color. Length, 2·5 to 3·5 inches.

Mazatlan to Panama.

There is but little difference between this and the preceding species: it has a more decided shoulder and the canal is shorter. Should they prove identical, which is probable, the species must be called *T. cingulatus*, Lam.

T. CLANDESTINUS. Lam. Pl. 9, fig 58.

Very light yellowish brown; the regular cord-like revolving ribs chestnut-brown; aperture white within.

Length, 1·5 to 2·5 inches.

Australia.

T. LIGNARIUS, Brod. Pl. 9, fig. 63.

Solid; yellowish brown, with dark chestnut revolving bands; columella with a double series of small tubercles which are white upon an orange ground; outer lip orange stained, with white tuberculations. Length, 1·25 inches.

W. Coast Central America; sandy mud, 7 to 12 fathoms

A very distinct species, readily recognizable by its sculpture and showy coloring.

*** Group *Cabestana*, Bolten.

T. CUTACEUS, Linn. Pl. 9, fig. 59.

The revolving ribs are elegantly sculptured into close, bead-like nodules. Light yellowish brown, white within the aperture.

Length, 2 to 3 inches.

Mediterranean Sea; W. Coast of France; Channel Islands; Cape Verd Isles.

The epidermis differs from that of most of the Tritons in being a thin, smooth skin. The species is found from low to deep water. Philippi describes the animal thus: Body on the upper part painted with irregular spots of dark purple, which are separated by narrow white lines; foot pale violet above, marbled on the sides, and speckled here and there with reddish spots which are edged with white.

T. DOLIARIUS, Linn. Pl. 9, fig. 60.

Pale yellowish to brown, sometimes spotted with brown on the ribs; white within the aperture. Epidermis short-tufted, light olive-brown or yellowish. Length, 1·25 to 1·75 inches.

Cape of Good Hope; New South Wales, Australia.

Ranella tuberculata, Risso, is a synonym of *T. cutaceus*, but the shell figured for Risso's species by Küster in his monograph of *Purpura* is a *T. doliarius*, typical in every respect.

T. AFRICANUS, A. Ad. Pl. 10, fig. 73.

Red-brown, white within the aperture. Length, 2·25 inches.

Ichaboe, S. Africa.

I separate this from *T. doliarius* with considerable hesitation. It may prove to be merely a lengthened, more solid form of that species I have before me an example of *T. doliarius* which is rather longer than usual, with the peculiar revolving sculpture almost obsolete.

T. FOSSATUS, Gould.

Shell solid, subglobose, yellowish; spire short; whorls six, the sutures profoundly canaliculate; surface with two revolving ribs, crossed by nodulous longitudinal undulations; aperture narrow, rounded behind; lip varicose, denticulate, sulcate within; columella erectly sulcate, the posterior sulci larger.

Length 35, diam. 20 mill. *Honkong, China.*

Not figured; said to approach *T. doliarius* in form and sculpture, but has the sutural canal and a longer beak.

T. SPENGLERI, Lam. Pl. 9, fig. 61.

Yellowish brown, the incised revolving lines chestnut-brown; all the ribs crossed by longitudinal striæ, cutting their surface into bead-like nodules; white within the aperture.

Length, 3·5 to 5 inches. *S. Australia; Chatham Islands.*

The epidermis is thin, smooth, yellowish olive.

T. Waterhousei, Ad. and Ang. Pl. 9, fig. 62.

Yellowish brown, somewhat tinged with olive; white within the aperture. Length, 2·25 inches.

S. Australia.

The spire is proportionally shorter, the shoulder of the whorls not so well marked; whorls more rounded than in last species. Epidermis squamately pilose.

T. Boltenianus, A. Ad.

Allied to *T. Spengleri*, but smaller, more ponderous, and without varices. The young shells are peculiarly inflated, and banded inside with dark purple ridges. Length, 2 inches.

Not figured. I have not seen it.

T. Barthelemyi, Bernardi. Pl. 10, fig. 69.

Yellowish white, the transverse grooves darker; brownish within the aperture. Length, 5·5 inches.

S. Australia, among rocks at low tide.

Evidently very closely allied to *T. Spengleri*, of which it will very probably prove to be an overgrown form, living amidst uncongenial surroundings.

T. labiosus, Wood. Pl. 9, figs. 64–68.

Shouldered; encircled by revolving ribs, each of which is bi-sulcate, so as to divide the rib into three; decussated by almost equally strong longitudinal costæ; canal usually short. Yellowish to dark chestnut-brown, sometimes light-banded; aperture and columella white. Length, 1 inch.

Japan, Philippines, Mauritius, Australia, West Indies.

The numerous specimens before me, from various West Indian localities, are not distinguishable from Australian examples. *T. Loroisii*, Petit (fig. 66), has no distinctive characters. *T. Strangei*, A. Ad. and Ang. (fig. 67), from Australia, has less shoulder and longer canal than the typical form, but I have before me a West Indian specimen which closely mimics the figure of that species. *T. orientalis*, Nevill (fig. 68), from the Indian Ocean, has a somewhat longer canal, but does not otherwise differ from the typical *labiosus*. These may be considered varieties by those who are fond of minute distinctions.

T. DORSUOSUS, A. Ad.

A Japanese species, not yet figured. No dimensions given. Assigned by the author to this group. The Latin diagnosis, as usual, is worthless for the purpose of identification. It is simply the cabalistic ceremonial through which Mr. Adams becomes invested with the title to a specific name; it does not and cannot, and perhaps never was intended, to define his property with sufficient accuracy to prevent trespass on his rights by others; therefore it becomes a trap for the unwary and ambitious. On the other hand the indefiniteness of the usual diagnosis permits its author the greatest latitude in shifting its object from species to species; or, if he is enterprising, in capturing some of the species diagnosed at a later date by his brother conchologists. As a rule, I will not attempt to identify unfigured species, and would like to exterminate all such descriptions and names for the benefit of science.

Subgenus **Cymatium**, (Bolten) Adams.

This group is well distinguished by the trigonal form of the shell of the typical species, large varices and nodules. Operculum with initial point at its apex.

T. FEMORALE, Linn. Pl. 10. fig. 70.

Yellowish brown; the principal revolving ribs white where they cross the varices; aperture white, light purplish or roseate within. Length, 3 to 7 inches. *West India Islands.*

Reeve mentions that the varices of this species suggested the gadroon border used by silversmiths for the decoration of plate. The epidermis is very thin, somewhat bristly. The initial point of the operculum is apical.

T. TIGRINUS, Brod. Pl. 10, fig. 71, 72.

Yellowish brown, tinged more or less with dark brown between the revolving ribs. Length, 4·5 to 6·5 inches.

W. Co. Central America; 11 fathoms in sandy mud.

A wider, smoother species than the preceding, with simpler sculpture. When full-grown, the outer lip spreads out, making the body whorl very wide.

T. Ranzanii, Bianconi (fig. 71) from Mozambique, E. coast of Africa, appears to be the same species.

T. LOTORIUM, Linn. Pl. 11, figs. 78, 79; pl. 10, fig. 76.

Orange-brown; the principal revolving ribs yellowish white upon the varices, where the interstices become intensified to a dark chestnut color; aperture white or blush color, the teeth of the outer lip varying from orange to chocolate, with blotches of the same on the columella. Length, 3·5 to 4·5 inches.

Red Sea, Indian Ocean, Philippines, Central Polynesia.

T. grandimaculatus, Reeve (fig. 76) belongs here; the distinctive characters are individual only.

T. PYRUM, Linn. Pl. 10, fig. 74.

Orange color; usually lighter within the aperture; the teeth of the lip and columella nearly white. Length, 3 to 4 inches.

Indian Ocean; Madagascar; Isle of Ticao, Philippines, under stones at low water.

T. DUNKERI, Lischke. Pl. 11, fig. 82.

White or yellowish, more or less irregularly variegated with brown; aperture, columella and lip-teeth white. Length 3·75 in.

Japan.

Very like *T. pyrum* in form, but thinner; the longitudinal nodules between the varices are much smaller, more continuous and more numerous, being seven or eight in number; whilst in *pyrum* they are five; the coloring also, is different.

T. MÜNSTERI, Anton.

Described as a species of the *lotorium* group. It has never been figured nor identified.

Subgenus Gutturnium, Adams.

The shells of this group possess a peculiar polished, porcellaneous outer and inner lip, the latter reflected over the columella, together with a short, rounded pyriform body and lengthened, narrow, more or less twisted canal. Operculum with initial point submarginal, near the middle of the inner margin.

T. CYNOCEPHALUS, Lam. Pl. 11, figs. 80, 81; pl. 15, fig. 152.

Light yellowish or orange, smetimes with deeper indefinate bands; aperture yellowish white; columella, especially the upper portion, with a brown patch. Length 2·25 to 3 inches.

West Indies; Philippines, 6 fathoms in coral sand.

Occasionally the longitudinal disposition of the tubercles prevails over the transverse, in which state the species has been re-described by Reeve as *T. moritinctus* (fig. 81). This, and intermediate forms are found in West Indian, as well as in Philippine Islands specimens.

T. SARCOSTOMA, Reeve. Pl. 10, fig 75.

Intervariceal ribs not so numerous, and more prominent than than in the preceding species. Yellowish brown. Lip tinged with orange; columella without the brown markings of *T. cynocephalus*. Length 2·5 inches.

On the reefs, *Isle of Ticao, Philippines.*

I admit this as a distinct species with some hesitation, as the growth of one rib or nodule at the expense of two smaller ones is not unusual in this and allied genera.

T. TRILINEATUS, Reeve. Pl. 10, fig. 77; pl. 11. fig. 87.

Longitudinal ribs distant, less prominent than the revolving series; shoulder of the whorls obtuse, defined by tubercles; body whorl a little attenuated below. Yellowish brown, whitish on the prominent nodes and revolving ribs; aperture white, columella brown stained. Length 3 inches.

Red Sea, Philippines, China.

Mr. Reeve distinguishes his *T. ægrotus* (fig. 87), from this species by the less developed tubercles on the shoulder, and by its having a varix on the back of the penultimate whorl: neither of which distinctions holds good. I consider it a synonym.

T. TESTUDINARIUS, Ad. & Reeve. Pl. 11, fig. 84.

The longitudinal ribs are more developed than the revolving ones, so that the shoulder of the whorls is less defined by tubercles; the canal is also longer than in *trilineatus*; which it greatly resembles.

Chinese Sea.

T. SINENSIS, Reeve. Pl. 11, fig. 85.

White, more or less stained with pale yellow.
Length, 3·5 inches.

Chinese Sea.

T. CLAVATOR, Lam. Pl. 11. fig. 86.

Whitish, varices more or less stained with brown; columella, and inner margin of lip orange. Epidermis bristly tufted on the ribs. Length, 2·5 inches.

Isle of Burias, Philippines; sandy mud, seven fathoms. Cuming.

T. GALLINAGO, Reeve. Pl. 11, fig. 89.

White, more or less stained with yellow on the varices. Length, 2·4 inches.

Isle of Mindanao, Philippines; sandy mud at 20 fathoms. Cuming.

More boldly sculptured, and with shorter canal than *T. Sinensis*;—of which it may prove to be a variety.

T. EXILIS, Reeve. Pl. 11, fig. 88.

Differs from *T. clavator* in having no varix on the penultimate whorl, in the white aperture, the surface vividly stained with orange-brown, and especially in the well-developed nodulous ribs. Length, 2·5 inches.

Isle of Zebu, Philippines; in sandy mud, 10 fathoms. Cuming.

T. PACHYCHEILOS, Tapparone-Canefri.

Differs from *T. exilis*, Reeve, in the columella being destitute of prominent rugose plications, in the less developed tubercles and canaliculate suture. White, variegated with orange, and obscurely doubly zoned with brown; varices two, maculated with dark brown; aperture white, lip with seven large teeth. Length, 55 mill.

Mauritius.

This species has not yet been figured.

T. MONILIFER, Ad. & Reeve. Pl. 11, fig. 90.

White, variegated with chestnut; lip and columella white. Length, 2 inches.

Chinese Sea.

The figure indicates a canaliculate suture, but it is not mentioned in the description. Possibly the preceding species is identical with this.

T. CAUDATUS, Gmel. Pl. 12, fig. 92.

A white shell, identical in sculpture and general appearance with *T. Sinensis*, except that the spire is more depressed, the whorls arising from deeply grooved sutures. Length, 3 inches.

Chinese Sea.

T. TRIPUS, Lam. Pl. 12, fig. 93.

Pale yellowish brown, lighter colored on the revolving ribs; white or pale blush within the aperture. Length, 2 to 3 inches.

Indian Ocean, China.

Like *T. caudatus*, this species has canaliculate sutures.

T. VESPACEUS, Lam. Pl. 12, figs. 94–100.

Very finely granulated; dorsal tubercles large, giving the shell a somewhat hump-backed appearance. Yellowish white, marbled and banded with brown. Length, 1·5 inches.

Australia, Viti Isles, Sandwich Isles. (Pease). *West Indies.* (Swift).

The above localities are all authentic. The typical full-grown shell is that described by Reeve as *T. Thersites* (figs. 99, 100), a form occurring both in the West Indian and Polynesian localities. *T. vespaceus* was described from a smaller, though perhaps full-grown shell, probably a more stunted growth. *T. elongatus* (fig. 96), and *T. gracilis* (fig. 97), of Reeve, are of somewhat more graceful form and have a longer canal; the latter is represented in the collection of the Philada. Academy by specimens from St. Croix, W. I., and from the Viti Isles.

T. TENUILIRATUS, Lischke. Pl. 12, fig. 105.

Shell varying from light to dark brown, white within the aperture. Varices four; whorls nine, of which the first four are embryonal and small. Length, 40 mill.

Japan; Sandwich Isles, (W. H. Pease).

I copy the figure of Dr. Lischke, which represents the unique and decidedly imperfect specimen from which he described his species.

T. AMICTUS, Reeve. Pl. 40, fig. 188.

Whitish, with a soft, sparingly bristled epidermis.

Length, 1·4 inches. *Philippines.*

I do not know the species. The figure somewhat resembles *Eupleura caudata.*

T. EXARATUS, Reeve. Pl. 12, figs. 102, 104.

Shell with two varices; the whorls flat shouldered; revolving ridges duplicate. Whitish, variegated or banded with brown, or brown with a white median band. Length, 1·75 inches.

Australia.

Has fewer varices, and the shoulder angle is not so gibbously nodulose as in the next species; yet I suspect them to be identical.

T. GIBBOSUS, Brod. Pl. 12, figs. 101, 103.

Shell with four varices; gibbous; strongly tuberculated on the margin of the flat shoulders; spire scalariform; surface closely covered with chain-like minute tuberculations. Yellowish brown. Length, 2·5 inches.

Panama; Monte Christi, W. Columbia, 7 fathoms, coarse sand.

T. LÖBBECKEI, Lischke. Pl. 12, fig. 106.

Very closely allied in general appearance, with *T. exaratus* Reeve, but the whorls are rounder, with shorter spire and canal; shoulder more rounded; spiral striæ finer; ribs between the varices obsolete. Length, 1·5 inches.

Japan.

T. PFEIFFERIANUS, Reeve. Pl. 13, fig. 107.

Yellowish white, with irregular darker bands; whitish within the aperture. Length, 2·5–3 inches.

Philippines.

T. RETUSUS, Lam. Pl. 13, fig. 108.

Yellowish-brown, sometimes maculated or banded with darker brown; aperture white within. Length, 2 to 2·5 inches.

Indian Ocean, Mauritius.

T. PYRULUM, Ad. & Reeve. Pl. 13, fig. 109.

Light yellowish brown. Length, 1·75 inches.

East Indies.

T. ENCAUSTICUS, Reeve. Pl. 13, fig. 110.

Light yellowish brown. When adult, the columella and lip are thickly enamelled, pale orange-brown. Length, 1·75 inches.

I. Ticao, Philippines; on the reefs.

T. TUBEROSUS, Lam. Pl. 13, figs. 111–113.

Light to dark brown, the ribs and tubercles lighter or whitish, with sometimes a median white band. Lip and columella thickly enamelled, white or yellowish; interior of aperture orange red. Operculum with terminal nucleus. Length, 1·5 to 2·5 inches.

West Indies, Indo-Pacific O., Mauritius, Polynesia.

Several authors have separated the West Indian and exotic specimens of this most common of Tritons, upon differences which are purely assumptions—the variations in coloration, length of canal etc. pervading specimens from either of the localities.

T. MAURITIANUS, Tapparone-Canefri.

Said to resemble *T. tuberosus*, but smaller, with differently shaped and ornamented mouth; shorter canal; smaller number of varices; and light color. Length, 32 mill.

Mauritius.

Not figured. It is very doubtful whether the species is a valid one; very probably it is one of the numerous variations of *T. tuberosus.*

T. CRISPUS, Reeve. Pl. 13, fig. 114.

Whitish or yellowish; lip and columella covered with white enamel; aperture blush or yellowish within. Length, ·75 inch.

Hab. *unknown.*

Has the appearance of a short, stout, miniature *tuberosus.*

T. QUOYI, Reeve. Pl. 13, fig. 116.

Varices four or five; whorls closely decussated, and nodulous at the crossings of the riblets. Orange-brown.

Length, 1·25 inches.

Australia.

This is the *T. viperinum* of Kiener, not Lamark—the latter being a distinct fossil form. *T. eburneus*, Reeve is closely allied, but may be distinguished by its shorter and more obtuse spire.

T. EBURNEUS, Reeve. Pl. 13, fig. 115.

Closely decussated; varices four; white. Length, ·75 inch.

Isle of Ticao, Philippines; under stones at low water.

T. VERRUCOSUS, Reeve. Pl. 13, fig. 117.

Varices four or five; whorls decussated and roughly nodulous. Orange-brown; lower portion of body whorl sometimes articulated with darker brown; aperture white within.

Length, ·85 inch.

Australia; Jamaica (one specimen, R. Swift).

*** *Cumia.*

T. CONVOLUTUS, Brod. Pl. 13, fig. 118.

White; whorls encircled by sharp, close revolving ridges. Length, 1·25 to 2 inches.

Marquesas (7 to 10 fathoms, sandy mud); *New Guinea*, (22 fathoms soft mud); *Philippines.*

T. SCALARIFORMIS, Brod. Pl. 13, fig. 119.

White; with sharp, close-set revolving ribs, crossed by slighter longitudinal ribs. Length, ·80 to 1·60 inches.

Panama.

Although the specimen figured shows sufficient distinction, I have individuals of intermediate character before me which render the separation of this and the last species somewhat doubtful. Typically, the position of the varices is different, and the decussated striæ of *T. Scalariformis* are coarser.

T. SPECIOSA, Angas. Pl. 13, fig. 120.

Shell with from 20 to 22 conspicuous, erect, rounded varices; yellowish white, with sometimes a pale chestnut, narrow band; with alternately larger and smaller concentric ridges, decussated by sharp, raised striæ into bead-like nodules; aperture white within.

Port Jackson, Australia; at very low spring tides.

The number of varices suggests the genus *Trophon.* I have not seen the species.

Subgenus **Epidromus**, (Klein) Adams.

T. MACULOSUS, Gmelin. Pl. 14, fig. 121.

White, shaded and spotted with chestnut-brown; aperture and columella white. Length, 3 inches.

Mauritius, Philippines, Amboina, Red Sea.

T. TENERUS, Gray.

"Shell ovate, turreted, thin, pale, fulvous, pellucid, cancellated, with equally fine longitudinal and spiral ridges; spire attenuated, longer than the mouth; whorls rounded; varices rounded; cancellated, with two brown spots. Mouth ovate, oblong; outer lip crenulated; throat smooth; inner lip thickened; smooth, elevated, canal short, perforated in front. Axis, 3·5 inches.

Hab.?

"Allied to *T. maculosus*, but thinner and cancellated." The above is the original description, and the species has not been figured nor recognized. Very probably it is founded on a thin specimen of *T. maculosus*.

T. Sowerbyi, Reeve. Pl. 14, fig. 122.

Shell encircled by brown, excavated lines, in pairs. Orange-brown, variegated with brown and ornamented with two distant rows of square brown spots. Length, 2·5 to 3 inches.

Galapagos Isles, in sandy mud at six fathoms (Cuming); *Red Sea*, (MacAndrew, Tapparone-Canefri); *Isle of France* (Chemnitz).

Said to live in the Red Sea at a less depth than *T. maculosus*; from 10 to 11 metres.

T. clathratus, Sowb. Pl. 14, figs. 123, 124, 129.

Whorls well-rounded, rapidly increasing, so as to form a stout, heavy shell, with small mouth and broad lip-varix. Covered with strong, sharp-set longitudinal ribs which are fimbriated by the crossing of revolving lines. Yellowish white, mottled with orange-brown. Length, 1·5 inches.

Indian Ocean.

The coarse, prominent sculpture, rounded whorls, and stout form distinguish this species. *T. Cumingii*, Dohrn (fig. 129), is described from an unusually stout specimen.

T. distortus, Schubert & Wagner. Pl. 14, figs. 125, 126.

Light yellowish brown, clouded with chestnut, with frequently, a median row of chestnut spots. Length, 1·25 to 2·5 inches.

Indo-Pacific Ocean. Polynesia.

This species is readily distinguished by its curved spire, which is caused by the single varices of each whorl occurring in a continuous oblique line. The animal is pale flesh-color with a fawn-colored head, and tentacles annulated with fawn-color. *T. tortuosus*, Reeve (fig. 126), cannot be considered even a variety.

T. obscurus, Reeve. Pl. 14, figs. 127, 128; Pl. 16, fig. 157.

Light brown, clouded with chestnut, with one or two revolving series of chestnut spots. Length, 1·5 to 2·25 inches.

Indian Ocean; Paumotus, West Indies, Cape Verd Is.

In sculpture this species resembles *T. distortus*, but it is distinguished by the straight spire, the varices far apart instead of in a continuous oblique series, and the revolving spots.

T. testaceous, Mörch (fig. 128), does not appear to differ in any appreciable degree from the type; it is the West Indian manifestation of the species. *T. comptus*, Sowb. (fig. 157), from China, is certainly the same species.

T. NITIDULUS, Sowb. Pl. 14, figs. 130–132.

Whorls smooth, polished, sometimes obsoletely granulated. Light brown, belted and spotted with darker brown, sometimes with longitudinal flame-like markings, sometimes with a white median band. Varices twelve or fourteen, usually maculated with brown. Length, 1 to 1·75 inches.

Paumotus, Central Polynesia.

Var. CEYLONENSIS, Sowb. Pl. 14, fig. 131.

Decussating ribs more prominent, giving the surface a closely granulated ornamentation.

Polynesia, New South Wales, Ceylon.

In both forms the granules are equally prominent upon the upper whorls of the spire, but in the smoother *T. nitidulus* this nodulation is finally covered by or lost in a smooth enamelled surface. *T. Brazieri*, Angas (fig. 132), inhabiting the coast of New South Wales offers no important differential characters. The lip and columella of the specimen described are tinged with orange color.

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T. RETICULATUS, Blainv. Pl. 16, figs. 160, 161.

Light brown, variously stained or banded with darker brown, sometimes uniform dark brown. Length, 1 inch.

Mediterranean Sea.

T. pygmæus, Reeve (fig. 161), does not differ. The Galapagos Islands are given by Reeve as a locality for *T. reticulatus*, but there is no subsequent confirmatory information.

T. LANCEOLATUS, Menke. Pl. 16, fig. 162.

Yellowish white or flesh-color, more or less clouded and spotted with brown; varices eight or nine, bearing brown spots.

Length, 1 inch.

West Indies, under stones and pieces of coral, in one or two feet water.

T. SIPHONATUS, Reeve. Pl. 15, fig. 133.

"Chiefly distinguished by its anterior extension." The figure shows evidences of juvenility, in the small development of the columellar lip. I think it will prove to be a young *T. lanceolatus*.

Habitat unknown.

T. ANTIQUATUS, Hinds. Pl. 15, fig. 134.

Whitish, with occasional brown spots on the varices.

Length, ·75 inch.

New Ireland, Viti Islands.

T. COXI, Brazier. Pl. 15, fig. 151.

Whorls with three revolving rows of brown dots on a light brown surface; body-whorl blotched and finely dotted.

Length 1 inch.

New South Wales, Australia.

Will probably prove to be a variety of *T. antiquatus*.

T. SCULPTILIS, Reeve. Pl. 15, fig. 135.

White, with a median brown band; the interstices of the longitudinal ribs upon the shoulder of the whorls are sometimes colored brown. Length, 1 to 1·15 inches.

Viti Isles; Mascarenes; Isle of Capul, Philippines, under stones at low water.

T. EXIMIUS, Reeve. Pl. 15, fig. 136.

White, sometimes obscurely banded or mottled with light brown. Length, ·55 inch.

Mascarenes, Philippines, Lord Hood's Isl., West Indies.

T. parvus, C. B. Ad., from the Caribbean region does not differ in any respect from Pacific specimens.

T. DECOLLATUS, Sowerby. Pl. 15, fig. 137.

Whorls transversely grooved, grooves dark brown; surface yellowish, clouded with brown. Length, 1 inch.

Isl. of Annaa; found on the reefs.

T. TRUNCATUS, Hinds. Pl. 15, fig. 138.

Orange-yellow, with generally, two white bands, and large brown spots disposed in revolving rows. Length, ·75 inch.

Isl. Bohol, Philippines, under stones at low water;
New Ireland; Viti Isles; Sandwich Isles.

A beautiful species, sharing with the following two a long cylindrical form and greatly truncated spire.

T. CYLINDRICUS, Pease. Pl. 15, fig. 139.

Yellowish white, ornamented with longitudinal blotches of dark reddish brown, regularly disposed, usually oblique on last whorl. Length, 10 mill.

Tahiti.

T. DECAPITATUS, Reeve. Pl. 15, fig. 140.

Whorls slightly, longitudinally ribbed, and closely concentrically striate. Yellowish, longitudinally flamed with brown, with two narrow yellow bands on the last whorl and one on the spiral whorl. Length, ·66 inch.

Kingsmill and Viti Isles.

T. BRACTEATUS, Hinds. Pl. 15, figs. 141, 148, 149.

Yellowish white, tubercles tipped with dark brown, frequently disposed as revolving rows of spots. Length, ·40 to ·60 inch.

Philippines, Marquesas, Sandwich Isles, Red Sea.

The old shells are frequently devoid of color, and whilst the longitudinal ribs remain, the revolving striæ and tubercles disappear; in this state the species has been redescribed by Reeve as *T. latevaricosus* (fig. 148).

T. bacillum, Reeve (fig. 149), is apparently founded upon a white specimen of *bracteatus* in a somewhat worn condition; the prominent varices on either side of the body-whorl mentioned by him are equally characteristic of *bracteatus*, and the additional spire varices of the latter are obsolete in some specimens.

T. DIGITALIS, Reeve. Pl. 15, figs. 142, 143.

White or light yellowish brown, with sometimes, faint brown revolving bands. Length, 15 mill.

Philippines, Mauritius, Viti Isles.

The spire is not so turriculate, the whorls without the shoulder; the sculpture finer than in *T. bracteatus*, Hinds.

T. CONCINNUS, Reeve. Pl. 15, figs. 144, 145.

Shell decussately striated, the longitudinal striæ rib-like on the spire and sometimes on the body-whorl. White or yellowish, with flame-like brown markings and clouds, which are sometimes subsutural, sometimes covering the entire surface, and occasionally modified into large spots. Length, ·66 inch.

Philippines, under stones at low water.

The sculpture is variable; in some specimens the longitudinal ribs are well developed, in others these are subordinated to the close revolving striæ. I unite with this species *T. tessellatus*, Reeve (fig. 145), the coloring and sculpture of which are not permanently distinctive.

T. ANGULATUS, Reeve. Pl. 15, figs. 146, 147.

Yellowish white, sometimes with narrow brown bands.

Length, ·5 inch.

Philippines, under stones at low water.

There is nothing but the slight shoulder on the whorls to distinguish this from *T. concinnus*.

T. FICTILIS, Hinds. Pl. 15, fig. 150.

Varices three, whorls longitudinally obliquely ribbed, and transversely finely striated. Brown. Smooth within the small aperture. Length, ·75 inch.

L'Agulhas bank, Cape of Good Hope, 50 to 60 fathoms.—Hinds.

I am not acquainted with this species.

T. PICTUS, Reeve. Pl. 15, fig. 154.

No varices. Longitudinally very closely ribbed, transversely elevately striated. Tessellated with reddish brown.

Length, ·7 inch.

Galapagos Is., under stones at low water.

I do not know this species, but the figure is singularly like a narrow form of *Columbella varia*, Sowerby.

T. CREBRISTRIATUS, Carpenter.

Shell like *T. pictus*, Reeve, but closely spirally striate; white, densely maculated with reddish chestnut; aperture scarcely varicose, simple within. Length, ·58 inch.

Bay of Panama.

Is destitute of the expressed spiral ribs of *T. pictus*. The only specimen seen has no teeth in the aperture. It may be only on the verge of maturity, or it may belong to a Buccinoid genus.

The above is a copy of the original description—which is worthless, as very probably is also the species. It may not really differ from *T. pictus*, or it may well be a young *Columbella varia*.

T. ANOMALUS, Hinds. Pl. 16, fig. 163.

Yellowish brown, with narrow, darker bands.

Length, 15 mill.

Isl. of Quibo, Veragua; found on the sandy shore at low water.

More ventricose than *T. pictus*, and the ribs more distant.

T. RETICOSUS, A. Adams. Pl. 16, fig. 155.

White, distantly maculate with brown; whorls seven, covered with rounded longitudinal plications, crossed by revolving liræ; lip lirate within; no varices except that of the lip.

Length, ·5 inch.

Japan.

Something like a *Phos*, and therefore a doubtful *Epidromus*. The species has not been illustrated heretofore; I give a figure from a specimen forming part of Adams' original lot.

T. PUSILLUS, Pease. Pl. 16, fig. 156.

Whorls six, non-varicose, plicately ribbed longitudinally and spirally striated; columella arcuate posteriorly, callous, smooth; outer lip denticulate. White, with irregular brown spots or flammules, longitudinally disposed, interrupted in the centre of each whorl by a narrow transverse white line. Length, ·25 inch.

Sandwich Islands.

Figured from a typical example in Coll. Acad. Phila.

T. SWIFTI, Tryon. Pl. 16, fig. 158.

Whorls eight, convex, without varices; covered with longitudinal rounded ribs, crossed by close revolving striæ. White, maculate with brown. Length 17, diam. 6 mill.

Isl. of Antigua, W. I. (R. Swift).

Differs from the related species by its narrow form, elongated sharp spire, small aperture, etc.

Unfigured and Doubtful Species.

I can only insert the descriptions of the following species, with which I am not otherwise acquainted.

T. LINEOLATUS, Conrad. Pl. 16, fig. 159.

Elevated, with brown revolving lines; spire scalariform; with numerous varices or costæ on the body-whorl; they are generally

smaller, and crenulate the revolving lines; labrum with four teeth within. Length, ·9 mill.

Tampa Bay, Florida.

I copy Conrad's figure, which is utterly unrecognizable; very probably the shell is an *Engina* or *Columbella*.

T. Bednalli, Brazier.

Shell elongately turreted, thickish, with six rather indistinct rounded elongated varices, spire straight, apex acute, whorls eight, convex, sculptured with regular close-set longitudinal ribs and transversely striated; ribs noduled at the suture, white, sometimes brown; aperture ovate-oblong, smooth within; columella arcuate, smooth, straight, outer lip thickened, white.

Length 11, breadth 3·75 lines.

Guichen Bay, S. Australia.

Approaches near to *Epidromus Brazieri*, Angas, and *E. Coxi*, Brazier.

T. limbatum, Phil.

Quoted in H. & A. Adams' Genera. I am unable to find any description of it.

T. papillatus, Dunker.

Shell small, subulately turreted, white; whorls seven, rounded; suture profound, subcanaliculate; closely longitudinally plicate, varicose, transversely striate, the last whorl a little smaller than the spire; aperture ovate, columellar lamina much expanded, canal short, recurved. Length 8 mill, lat. 3 mill.

Viti Islands.

T. Angasi, Brazier.

Fusiform, turreted, thin, with eight distinct rounded varices; spire slightly twisted in the centre, apex obtuse, whorls seven, slightly convex, sculptured with longitudinal fine ribs, transversely lined, interstices with very minute striæ, suture rather deep, crenulated at the edge; whitish, besprinkled with chestnut-brown spots, a blotch of the same color somewhat square in front of the varices; the back of the last whorl showing more of the irregular, nearly obsolete brown spots; columella straight, thickened with a white, expanded callus, smooth, outer lip thin at its edge, thickened

behind, minutely denticulated within; aperture oblong-ovate, white within; canal very short, recurved.

Length 10, breadth 3 lines.

Torres Straits, Australia.

It differs from *Epidromus Coxi* by having coarser sculpture, varices larger, more distorted at the third and fourth whorl from the aperture by one slightly bulging to the right, and the other to the left; the outer lip thin at the edge, very much thickened behind and more strongly crenulated at the suture.

T. GLADIOLUS, Monterosato.

A small flattened species, with dichotomous varices like the true Ranellæ, the canal short, recurved, the mouth rounded, the whole shell lance-shaped, without sculpture, white.

Length 12, diam. 5 mill.

Alexandria, Egypt.

This species has not yet been figured. The description would not be unlike a worn specimen of *Ranella pusilla*, Brod., which is recorded from the Red Sea.

T. VITREUS, FOXII, CANCELLATUS, all of Gray, Beechey's Voyage, 110, 1839.

These species have not been recognized by any author during the forty years which have elapsed since they were published. They have not been figured.

T. OBSCURUS, A. Adams, *South Coast of Africa;* T. PYRIFORMIS, A. Adams, *China;* T. COMPTUS, A. Adams, *China.*

Not figured nor recognizable.

Subgenus **Priene**, H. & A. Adams.

This small group contains shells of comparatively large size, thin, cancellate, white without any bands or spots of color, usually more or less covered by an epidermis; the operculum has a terminal initial point. The species inhabit a somewhat limited region, the West Coasts of South and North America, one of them recurring on the Japanese coast. The rarity of varices and general appearance of these shells indicate a passage into the Fusidæ, whilst they appear to connect more remotely with the *argus* group of *Ranella* and with *Buccinum*.

T. CANCELLATUS, Lam. Pl. 16, figs. 164–167; pl. 17, figs. 170–172.

Varying from cancellated to coarsely decussated surface, in the latter the intersections of the longitudinal and revolving striæ frequently rounded nodulous. The epidermal fringe upon the nodules is sometimes half an inch in length.

Length, 3 to 4·5 inches.

Straits of Magellan, Chili, Oregon, Alaska, Japan.

I agree with P. P. Carpenter that *T. Oregonensis*, Redfield (fig. 167), is synonymous with this species; the want of the ridge upon the upper part of the columella by which Mr. Redfield distinguishes his species, being in consequence of the juvenility of his type specimen. The variation in the sculpture which, in his type, may have supported the view of specific distinction, includes every intermediate stage in specimens before me, and in some of them, a portion of the shell is rudely cancellated whilst another portion is smoother and more finely decussated. The northern distribution of *T. cancellatus* is undoubted, but its occurrence upon the southern coast of South America is not so certain, although probable.

The male (figs. 171, 172), and female (fig. 170), of this species are, according to Gould, distinguished by their coloration; the shells also differ somewhat in form.

T. SCABER, King. Pl. 16, fig. 168.

Varies like *T. cancellatus* in the closeness and prominence of its sculpture. The internally toothed lip and closely bristled, persistent epidermis are quite characteristic of the species.

Length, 1·5 to 2·25 inches.

Valparaiso, (7 to 45 fathoms) *northwards to the coast of Bolivia; Arctic America to California.*

T. RUDIS, Brod. Pl. 16, fig. 169.

Whitish, with a yellowish brown, close, rather persistent epidermis. Length, 1·5 to 2 inches.

Chili; Iquiqui, Peru, in mud and sand, 6 to 10 fathoms, and in coarse gravel, 9 fathoms (Cuming).

Genus **DISTORSIO**, Bolten.

This genus, in its ringent aperture reminds one of the genus *Malia* in the Doliidæ.

D. ANUS, Linn. Pl. 17, figs. 173, 174; pl. 15, fig. 153.

White, with reddish brown bands; columellar plate and lip flesh white. Length, 2 to 3 inches.

Red Sea, Indian Ocean, Philippines, Society Islands, under stones at low water (Cuming).

The operculum (fig. 174) is curiously modified in form to suit the contracted aperture of the shell, with central nucleus.

D. CANCELLINUS, Roissy. Pl. 17, figs. 175–178.

Yellowish brown, without bands; spire and canal proportionally longer than in *D. anus;* surface peculiarly divided into squares by the distant, decussating narrow ribs; epidermis light brown, velvety; columellar plate and lip varying from very light to dark salmon color. Length, 1·75 to 3 inches.

Ceylon; China; Philippines, in coral sand, 6 fathoms (Cuming); *St. Thomas and other West Indian Islands; Monte Christi* and *Xipixapi, W. Columbia,* sandy mud, 7 to 10 fathoms (Cuming).

D. constrictus, Brod (fig. 176) from the West Coast of tropical America, as well as *D. ridens* (fig. 177) and *D. decipiens* Reeve (fig. 178), from the Philippine Islands have no claim to rank even as varieties.

D. PUSILLA, Pease.

Shell solid, oblong ovate, gibbous, somewhat distorted, four or five varices; whorls beautifully latticed, with rather coarse granular raised ridges and fine microscopic spiral striæ; aperture small, narrow; outer lip thick, strongly dentated on inner edge, sinuated above; columella deeply excavated and plicately toothed; canal short.

Only a single specimen has been found, too much faded to determine its color. It is pale yellow, with faint traces of brown.

The above is the original description in full; it does not give any characters not possessed by *D. cancellinus.*

Genus **RANELLA**, Lam.

In *Ranella* the tentacles are commonly somewhat closer together than in *Triton*, and the head is longer and narrower than in *Murex* and *Fusus;* the eyes in some species are nearly basal, but are generally placed about the middle of the tentacles on their outer sides; the siphon is short and directed upwards; the foot larger than in *Triton*, *Murex*, or *Fusus*, and considerably dilated both before and behind; the mantle does not appear to be furnished with fimbriated processes as seen in some Murices. In some species the trunk is enormously developed, whilst in others it is not protruded, in the usual condition of the animal. Operculum ovate, horny, with a lateral nucleus and semicircular elements.*

The species are inhabitants of warm seas, and principally tropical: those of the typical group, having winged varices live in deep water, whilst the nodose species forming the sub-genus *Lampas*, are found at less depth, and prefer coral reefs and rocks. The animal is active in its movements. *Eupleura*, formerly considered a subgeneric group of *Ranella*, is now classed with Muricinæ, on account of the lingual dentition of one of its species.†

I have retained the generic name *Ranella* in preference to *Bursa*, *Gyrinium*, *Bufo*, *Rana*, etc., all of which have priority, but were obscurely published and have never attained general acceptance.

Mr. Macdonald ‡ thus describes the larval state of *Ranella*:

"I next observed a stout little shell, much resembling a *Macgillivrayia* in form, but having the spire more minute and sharply marked, and the whorls beset with epidermic spines, disposed in close spiral lines. The microscopic examination of the animal gave unmistakable proof of its being a *Ranella*, the lingual dentition agreeing, at least generically, with my figures and specimens. On examining the operculum, which in *Ranella*, is so very remarkable, exhibiting three successive stages of growth, I found that it was quite of the same character, only that it had but yet attained the second stage. Finally, on comparing the whole operculum, and the little shell respectively, with the nucleus of the operculum and the apex of the shell of an adult

* Adams and Reeve, Voy. Samarang, 37.

† For the species of *Eupleura* vide Vol. II, p. 157.

‡ Linn. Trans. XXIII, 69.

Ranella, I could detect no points of difference, even with magnifying powers; the conclusion, therefore, is irresistable, that the one is but the young state of the other."

Subgenera.

LAMPAS, Schum. Shell turreted; whorls nodose; aperture with posterior channel; canal very short and recurved.

ASPA, H. and A. Adams. Shell ovate, ventricose, smooth; spire very short; whorls nodulous at the angles; aperture with posterior channel.

ARGOBUCCINUM, Klein. Spire elevated; canal short; posterior channel wanting.

(*Typical.*)

Genus **RANELLA**, Lam.

R. SPINOSA, Lam. Pl. 18, fig. 1

Light brown, obsoletely banded or mottled with a darker shade. Length, 2 to 3 inches.

Red Sea, Indian Ocean, Philippines, Mauritius.

R. FOLIATA, Brod. Pl. 18, fig. 2.

Light yellowish brown, both margins of the aperture deep orange. Length, 2·25 to 3 inches.

Mauritius.

Very closely allied to *R. crumena*,—with which it has been confounded: the only differences are the color of the margins of the aperture, the greater extension of the superior sinus-foliation, and more distinct wrinkles of the inner lip. It may be only a varietal form of *R. crumena*.

R. CRUMENA, Lam. Pl. 18, fig. 3.

Yellowish brown, with darker bands or spots; aperture white, lips more or less stained with orange. Length, 2 to 3·5 inches.

Ceylon, Philippines.

R. MARGARITULA, Deshayes. Pl. 18, fig. 4.

Light brown, with darker spots on the principal tubercles; white with a roseate blush within the aperture, with sometimes close, narrow brown bands. There is a singular depression upon the lower part of the columella. Length, 1·25 to 2 inches.

Indian Ocean.

Very close to *R. crumena*, Lam., and perhaps only a variety of that species. It is usually smaller, more uniform in color, with the granules of the surface closer, and more distinct.

R. ALBIVARICOSA, Reeve. Pl. 18, figs. 5, 6.

White, stained with reddish brown; varices usually white; aperture roseate. Length, 3 inches.

India, Java, N. E. Australia.

More inflated and thinner than the related species.

R. SUBGRANOSA, Sowb. Pl. 19, fig. 8; pl. 18, fig. 7.

Spire and canal more drawn out than in the preceding species, not so much inflated; tubercles less prominent. Marbled light brown and white; interior roseate. Length, 3 to 3·5 inches.

Chinese Coast, Manilla.

R. elegans, Beck (fig. 7), is a variety in which the two principal rows of tubercles are more spinosely developed.

R. NANA, Sowb. Pl. 20, fig. 15; Pl. 19, fig. 9.

Purple or reddish brown, with a white band; lip and aperture white. Shoulder of the whorls encircled by a row of tubercles, rest of surface granulate or smooth. Length, 1·5 inches.

Panama; in coarse sand, 10 fathoms (Cuming).

The smooth form (fig. 15) is typical; the granulate shell has been called by Sowerby, *R. albifasciata* (fig. 9), and may retain its name as a variety.

R. CRASSA, Dillw. Pl. 19, fig. 10.

Yellowish brown, irregularly banded with white and chestnut; lip and columella usually tinged with yellow. Shell thick; surface obsoletely or distinctly granulate, with frequently one or two larger nodes on the middle of the front and back of the angle of the whorls; posterior canal long, bordered by the fimbriated lip. Length, 1·25 to 2·5 inches.

West Indies, Northern Coast of S. America.

Subgenus **LAMPAS**, Schum.

R. LAMPAS, Linn. Pl. 19, fig. 12.

Whitish or cream-color, stained and variegated with orange-

brown; flesh-color within the aperture; in the young shells orange-red within the aperture and on the lip.

Length, 3 to 9 inches.

Red Sea, Indian Ocean, Philippines, Ins. Viti, Mauritius.

The most ponderous species of the genus. The half-grown shell, when 3 to 5 inches long, is quite thick and already possesses adult characters; it is more highly colored than the larger specimens.

R. BUFONIA, Gmelin. Pl. 21, figs. 21–23, 28, 29, 68; Pl. 19, fig. 11; Pl. 20, figs. 13, 14.

White, brown punctured and spotted; lip and interior white or yellowish. Length, 2·5 inches.

Red Sea, Philippines, Seychelles, I. Bourbon, Paumotus, etc.

R. tuberosissima, Reeve (fig. 14), is the young of this species, with the lip-margin and interior more deeply yellow stained. *R. asperrima* (fig. 29), and *Grayana*, Dunker (fig. 28), are synonymous.

Var. VENUSTULA, Reeve. Pl. 20, fig. 13.

Lip and columella stained with very dark purple; aperture roseate within. *R. siphonata*, Reeve, (Pl. 19, fig. 11), is a synonym.

R. CRUENTATA, Sowb. Pl. 21, figs. 24–27, 30, 31.

Light yellowish or brownish white, the principal tubercles frequently maculated with red; white or rosy within the aperture, columella sometimes with dark red spots.

Length, ·75 to 1·5 inches.

Mauritius, Philippines, West Indies.

The spots on the columella are not always present in the Philippine specimens constituting the type form, and are not found in the variety. This species is very closely related to *R. bufonia*, but is uniformly much smaller and the siphon is not continued up the spire in the peculiar manner of that species.

R. verrucosa, Sowb. (fig. 27), is a rather remarkable looking shell, as represented in the monographs, but is nothing else than a worn specimen of *R. cruentata*, in which the nodules become smooth and darker in color. I have before me several

intermediate stages which prove their identity. A large *cruentata*, with the tubercles dark, and the shell in a fresh state has been called *R. rugosa* by Mr. Sowerby (fig. 31).

Var. RHODOSTOMA, Beck. Pl. 21, fig. 25.

Shell smaller; aperture roseate within; columella white. This variety inhabits several West Indian localities, and these were named *R. Thomæ* by d'Orbigny (fig. 36), but they do not differ at all from Philippine and Mauritian specimens.

R. CALIFORNICA, Hinds. Pl. 22, fig. 42; Pl. 21, fig. 32.

White, variegated and interruptedly banded with chestnut; fine specimens are roseate within the aperture.

Length, 2·5 to 4 inches.

California, Lower California.

P. P. Carpenter considered this species identical with *R. ventricosa*, Brod., and they are certainly so similar as to indicate a common ancestry; *ventricosa*, however, is much thinner (*very* thin for a *Ranella*), more ventricose, spire shorter, surface smoother, nodules less developed and more numerous; *R. Californica* is found in the pliocene and post-pliocene formations, of California. *R. Thersites*, Redfield (fig. 32), is a synonym.

R. VENTRICOSA, Brod. Pl. 20, figs. 16–18.

White, when fresh, mottled and banded with chestnut; aperture white within. Shell very thin for the genus.

Length, 2 to 3 inches.

Callao, Peru.

D'Orbigny dredged this species in 8 to 10 metres' depth, rocky situation with strong current. The eggs are deposited in crowded groups upon *Macrocystis;* they are yellowish or reddish in color.

R. SCROBICULATOR, Linn. Pl. 20, figs. 19, 20.

Mottled yellowish brown and white, with faint darker bands. Surface thickly covered with papillary tubercles.

Length, 2 to 3·5 inches.

Mediterranean Sea.

Described as a *Triton* and still referred to that genus by several distinguished conchologists. Like *R. lampas* it has the varices of a *Triton*, but otherwise the facies of a *Ranella*, and I think

that the balance of characters will agree best with its position in the present genus. I cannot doubt that *R. coriacea*, Reeve (fig. 20), is a juvenile state of the same species.

R. PUSTULOSA, Reeve. Pl. 22, fig. 33.

Shell ponderous, chestnut-colored, with two or three rows of chocolate-colored, distant, rounded tubercles; margins of aperture orange-brown. Length, 1·5 to 2·25 inches.

Ascension Isl., Atlantic O., 280 m. N. W. of St. Helena.

Larger and more ponderous than *R. cælata*, with larger and less numerous tubercles; the latter, however, are more numerous on the earlier whorls, and it would probably be difficult to distinguish a young specimen from *R. cælata*. The great difference in the habitat of the two species may readily account for their distinctive features, supposing, as is probable, that they were originally derived from a common stock.

R. CÆLATA, Brod. Pl. 22, fig. 34.

Shell dark chestnut-color, with a number of dark chocolate colored tubercles, arranged in several rows.

Length, 1 to 1·75 inches.

Panama.

R. CANDISATA, Lamarck. Pl. 22, fig. 43.

Yellowish white, maculate with brown. Length, 4 to 5 inches.

Philippines, Isle of Annaa.

Distinguished from the following forms by its large size and elongated spire,

R. GRANIFERA, Lam. Pl. 22, figs. 35–37.

Shell with high spire, rather thin. Light yellowish brown, stained and maculated with a darker tint, sometimes obscurely white banded, tubercles white; white within.

Length, 1·5 to 2·25 inches.

Red Sea, Natal, Paumotus, Philippines, N. E. coast of Australia.

R. semigranosa, Lam., (fig. 37), is a state of this species in which the granules are obsolete. I separate *R. affinis*, Brod. (with its synonyms), from this species only with great doubt, for although that species is normally more ventricose, with larger tubercles, replacing the granules in one to three rows, yet there are intermediate forms which it is difficult to place.

R. AFFINIS, Brod. Pl. 22, figs. 38–41 ; pl. 23, fig. 55.

Light yellowish or fleshy white, frequently rose-tinted towards the apex ; surface stained and spotted with brownish red ; tubercles of the angle largest, sometimes bipartite.

Length, 1·5 to 2 inches.

Philippines, New Caledonia, Ins. Annaa, Samoa Isles ; also *West Indies.*

R. livida, Reeve (fig 39), is a less angulated form with the tubercles more nearly equal in size throughout. I cannot detect any difference in the West Indian shells, of which *R. ponderosa*, Reeve (fig. 55), may represent the typical *affinis*, whilst *R. Cubaniana*, d'Orb. (fig. 40), is equivalent to *R. livida*. So many intermediate stages of development of angle and tubercles occur that no separation of the species is possible; moreover, the identity of the whole with *R. granifera*, Lam., is probable.

Subgenus **Aspa**, H. & A. Adams.

R. MARGINATA, Gmelin. Pl. 23, fig. 52.

Porcellanous, polished ; white with a light yellowish tinge.

Length, 20 to 35 mill.

E. Coast of Africa ; fossil in *Piedmont.*

Subgenus **Argobuccinum**, Klein.

R. GIGANTEA, Lam. Pl. 24, fig. 69.

Very light yellowish brown, more or less stained with darker brown. Length 5 to 7·5 inches.

Mediterranean ; Miocene and Pliocene of *S. Europe.*

R. LEUCOSTOMA, Lam. Pl. 23, figs. 53, 54.

Chestnut-brown, variegated with white upon the varices, under a short velvety brown or green epidermis ; aperture white within.

Length, 2·5 to 3·5 inches.

Australia, Tasmania, New Zealand.

This is one of the species which (like *gigantea*, *lampas*, etc.) appears to partake almost equally of the characters of a *Triton*. The operculum like the *Triton*, has a terminal initial growth.

R. BITUBERCULARIS, Lam. Pl. 23, fig. 44.

Yellowish brown, white within the aperture.

Length, 20 to 28 mill.

Indian Ocean, Philippines, Australia.

The tubercles are numerous on the earlier whorls, but (in some instances) coallesce into two large ones between the varices on the last whorl of the adult. When the more numerous tubercles are persistent, the resemblance to the next species is striking, there being little to distinguish them except coloration.

R. TUBERCULATA, Brod. Pl. 23, figs. 45–47.

Chestnut-brown, with infra-sutural and submedian lighter bands; the numerous small tubercles regularly disposed and dark chocolate color. Length, 20 to 40 mill.

Red Sea, Indian O., China, Malacca, Manilla, Tahiti.

Very doubtfully distinct from both the preceding and succeeding species. *R. fusco-costata*, Dunker (fig. 45), is a half-grown shell of this species in which some of the tubercles have become confluent into longitudinal ribs.

R. PULCHRA, Gray. Pl. 23, fig. 51.

Light yellowish or nearly white, mottled or obscurely banded with light brown; aperture white. Length, 1·6 to 2·25 inches.

Philippines, Japan.

H. and A. Adams include this species in *Eupleura*, a section of the Ranellæ which, on account of the dentition and general resemblance of the shells to *Urosalpinx*, etc., has been placed in the Muricinæ: it shows no close relationship to the species of *Eupleura*, however.

R. GYRINA, Linn. Pl. 23, fig. 48.

Shell white, with two dark chestnut bands on the body-whorl and one on those of the spire. Tubercles larger than in *R. tuberculata*, disposed to become confluent into ribs longitudinally. Length, ·75 to 1·5 inches.

Torres' Straits, Australia; Viti Isles.

R. CUSPIDATA, Reeve. Pl. 23, fig. 49.

Light orange-color; ponderous; the last whorl bituberculate between the varices. Length, 1·5 inches.

Philippines.

Somewhat like *R. bitubercularis* but more pyramidal, and wants the long canal of that species; it is also heavier in its growth.

R. PUSILLA, Brod. Pl. 24, figs. 56–58, 66; pl. 23, fig. 50.

Color varying from white, more or less stained with rose (typical) to uniform roseate or rosy with yellow varices (var. *R. rosea*, Reeve, fig. 58), or light chestnut with a median white band (*R. concinna*, Dunker, fig. 50). Length, 10 to 20 mill.

Red Sea, Indian Ocean, Philippines, Australia, New Caledonia, Tahiti, Lord Hood's Isl., Sandwich Isles, Natal.

The intermediate stages of coloration and perfect similarity of appearance of the three species indicated above, justify their union under the oldest published name. *R. polychloros*, Tapparone-Canefri, agrees well with a variety of *R. pusilla* from the Sandwich Islands in Coll. A. N. S. Philada., having a purple-tinted aperture, dirty white exterior surface and chestnut bands. I can scarcely doubt its identity with *R. pusilla*. It has not been figured.

R. ANCEPS, Lam. Pl. 24, figs. 59, 67.

Pure white; obsoletely bi-triplicate between the varices, encircled by revolving lines. Length, ·4 to 1 inch.

Torres' Straits, Australia; Japan; Viti and Sandwich Isles; Panama; West Indies.

The above localities have all been duly verified, and notwithstanding the very extensive distribution there does not appear to be any variation in the species. In general appearance it is much like some of the small Tritons of the subgenus *Epidromus*.

R. HASTULA, Reeve. Pl. 24, fig. 60.

Chestnut-brown, varices yellowish; transversely granulately striated. Length, 15 mill.

Hab. unknown.

R. ARGUS, Gmelin. Pl. 24, figs. 61–65.

Longitudinally plicately noduled, the nodules being either distant and large or crowded and small; in the latter case they are scarcely connected by longitudinal ridges, and being rubbed white, upon the brown, banded shell, have given rise to the name of the hundred-eyed monster. Fresh specimens are covered with a closely-wrinkled brown epidermis. Outer lip of shell thickened and coarsely dentate within, sometimes in the adult, developing

a tooth, like *Monoceros;* columella plicate in the young, much thickened and smooth in the adult shell. Length, 2·5 to 4 inches.

Cape of Good Hope; Ins. Chiloë and Conception, Chili; Chatham Isles, New Zealand; Isle of St. Paul, Indian Ocean.

The type-form of this species (fig. 61) is from Cape of Good Hope, whilst the *R. Ranelliformis*, King (= *vexillum*, Sowb. fig. 62), supposed to be distinguished by being lighter in structure, more fusiform, columella wrinkled, no tooth on outer lip, etc., is from W. Coast of S. America; found in rocky places at from 3 to 10 fathoms by Mr. Cuming. There is every gradation between the two forms, however, even in Cape specimens, and I cannot separate them even as varieties.

Mr. Vélain* remarks that *R. proditor* (fig. 64 = this species) is very plentiful at the Islands of Amsterdam and St. Paul, in the Indian Ocean, where the skeletons of seals, abandoned on the rocks at low-water by the fishermen, were literally covered with lobsters and Ranellæ at the succeeding tide. They are nocturnal in habit and may be readily fished by suspending over-night, in 10 or 15 metres depth, the body of a bird or fish.

Undetermined Ranellæ.

The following species being unfigured, cannot be placed definitely:

R. PRODUCTA, Pease; R. LUTEOSTOMA, Pease; both from the *Sandwich Islands.*

R. JUCUNDA, A. Adams; *North Australia.*

R. EPITREMA, Tenison-Woods. This is described as a widely ovate, whitish species, not quite an inch in length; it is nodose and lirate, with a conspicuously margined lip, dentate within. It has a deeply canaliculate suture, causing the varices to overlap in a singular hooked manner. *Australia.*

The description agrees very well with that of *R. jucunda*, A. Adams.

R. PAULUCCIANA, Tapparone-Canefri; *Mauritius.* Possibly one of the numerous varieties of *R. cruentata*, Sowb.

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* Archiv. Zool. Exp. VI, 100.

Family FUSIDÆ.

Shell more or less spindle-shaped, without varices; the lip of the aperture not thickened.

Operculum ovate, acute, with apical nucleus.

The animal possesses the essential features of a *Murex*.

Dentition. That of the typical genus *Fusus* does not differ essentially from that of *Fasciolaria;* Stimpson states* that it has the saw-like lateral teeth of *Fasciolaria*, whilst Macdonald† found another species to possess lateral teeth of the Muricoid type. Troschel finds a Fasciolarioid dentition in *Fusus Syracusanus*, and he has accordingly made for it a new genus, *Aptyxis;* but Schacko has recently found the same dentition in *Fusus inconstans* Lischke, a typical *Fusus*. I think that Macdonald must have mistaken some other genus for *Fusus*. The dentition of *Sipho*, which, according to Troschel, resembles that of *Fasciolaria* is shown by the more recent investigations of Sars to be Buccinoid. *Ptychatractus*, with evident resemblance to *Fasciolaria* has a peculiar dentition, approaching *Murex*, and on this character alone Stimpson, followed by Gill, assigns to it a distinct family.

Neptunea, *Melongena*, etc., long classed with Fusidæ are now brought into more intimate relationship with *Buccinum*, and *Busycon*, and *Tudicla* will go into the same group; on the other hand *Peristernia*, *Latirus*, etc., formerly included in Turbinellidæ have a Fasciolarioid dentition, which, with added conchological characters may suffice for their removal from that to the present family. Stimpson‡ describes and figures the dentition of an unknown species of *Peristernia* from the coast of Georgia, which has the essential features of *Busycon*, and he thereupon places the genus in Neptuniinæ; but it is evident that he was in error, as Troschel figures known species, which are Fasciolariform in dentition as they are in conchological characters.

Sub-family *Fusinæ*. Columella not plicate, not tortuous.

Sub-family *Fasciolariinæ*. Columella tortuous with oblique plaits or plications.

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* Am. Jour. Conch. I, 54.

† Ann. Mag. Nat. Hist., 4th Ser. II, 243.

‡ Am. Jour. Conch., I, 60.

Sub-family *Ptychatractinæ*. Differs from Fasciolariinæ in lingual dentition, and includes only three small boreal species.

Sub-family *Peristerniinæ*. Columella with transverse plications.

Synopsis of Genera.

Sub-Family FUSINÆ.

FUSUS, Lam. Shell fusiform or spindle-shaped; spire many-whorled, acuminate, longer than the last whorl; aperture oval; canal long, straight, narrow; columella smooth, arcuated. Dentition, Pl. 25, fig. 1.

Subgenus SINISTRALIA, H. and A. Ad. Shell reversed, fusiform; canal long; whorls rounded.

AFER, Conrad. Shell short fusiform, spire and canal moderate, body whorl rather large, shouldered and tuberculate, aperture channelled behind, outer lip dentate within. (Professor Meek * states that the fossil species described by Conrad, are not congeneric with the type, the recent *Fusus afer*, Lam., and he refers them to Conrad's genus *Pyrifusus*, one of the forms of *Neptuniinæ*.)

CLAVELLA, Swains. Shell solid, thick, subfusiform; spire acuminate; last whorl suddenly contracted in front, thickened and rounded next the suture; aperture narrow, canal long and straight; columella excavated in the middle; outer lip simple. Operculum ovate; nucleus apical. Dentition, unknown.

Peistocheilus, Meek. Described as a subgenus of *Fasciolaria*, appears to be identical with *Clavella*, as Meek himself subsequently suspected. The columellar plaits are nearly obsolete, situated so far within the aperture as to be barely visible and in many specimens are not seen at all. *Clavella* itself occasionally shows these adventitious and inconspicuous plaits. The shell is so decidedly fusiform that I place it in the Fusinæ in preference to the Fasciolariinæ despite these folds. The dentition of *Clavella distorta* corresponds with that of *Cantharus*, *Euthria*, etc., with which the genus has heretofore been associated in the sub-family Pisaniinæ, and this species and its allies are also conchologically related to that sub-family, but the fossil types and the recent *C. serotina* are generically different, so that the genus as thus restricted must be placed here.

I figure the type of Meek's subgenus *Peistochilus*.

P. Scarboroughi, Meek and Hayden, Pl. 28, figs. 41, 42. Cretaceous; *Butte au Grès, Missouri River*.

BUCCINOFUSUS, Conrad. Shell ventricose, spirally sculptured; epidermis pilose; spire produced; canal moderate in length; columella

* Pal. Hayden's Survey., IX, 344.

smooth. Dentition, pl. 25, fig. 4. The type of this genus is a miocene fossil. *B. parilis* Conr. (Pl. 28, fig. 40): the recent species is *Boreofusus Berniciensis*, the type of a genus described by Sars, which becomes a synonym.

Sub-Family FASCIOLARIINÆ.

FASCIOLARIA, Lam. Shell fusiform; spire acuminated; aperture oval, elongated; canal open, moderate in length, nearly straight; columella smooth, with a few oblique plaits at the forepart; outer lip internally crenate. Dentition, pl. 25, figs. 2, 3.

Sub-Family PTYCHATRACTINÆ.

PTYCHATRACTUS, Stimpson. Shell fusiform, spirally striated; aperture with a moderate canal; columella plicated as in *Fasciolaria*. Dentition, pl. 25, fig. 5.

MEYERIA, Dunker and Metzger. Shell elongate fusiform, longitudinally obtusely plicate; spire produced; canal exserted; columella obscurely plicate. Operculum irregularly ovate; apex obtuse; nucleus inconspicuous. Dentition, pl. 25, figs. 6, 7.

Sub-Family PERISTERNIINÆ.

PERISTERNIA, Mörch. Shell turreted, not umbilicated; whorls longitudinally ribbed; aperture oval; canal moderate and recurved; outer lip thin and crenulated; columella with one or two slight plaits anteriorly, Dentition, pl. 25, fig. 8. The want of umbilicus, less distinct columella folds and recurved canal are the principal (and not sufficient) distinctions from *Latirus*.

LATIRUS, Montf. Shell turreted, fusiform, sometimes umbilicated; spire produced; whorls nodulous, aperture oval-oblong; outer lip thin, crenulated; columella straight, with two or three small oblique plaits in front. Mr. H. Crosse remarks upon the insufficiency of the diagnosis of *Latirus* by Montfort and H. and A. Adams, and proposes to relegate the species to *Turbinella;* that genus, however, may be more advantageously restricted to the forms for which the genera *Vasum* and *Mazza* have been constituted.

LEUCOZONIA, Gray. Shell oval, subglobose, shouldered; spire moderate; aperture oblong; canal short; columella subflexuous, with small oblique, unequal plaits; outer lip sub-acute, with a more or less prominent tooth or tubercle at the forepart. Dentition, pl. 25, fig. 9.

Subgenus LAGENA, Schum. Whorls rounded above, not shouldered.

Fossil Genera and Subgenera.

Sub-Family FUSINÆ.

Subgenus EXILIFUSUS, Gabb. Shell very long, slender, fusiform ; spire high ; aperture produced into a long, slender, twisted canal.

This group differs from the true genus *Fusus*, as restricted, by its twisted, slender canal. In this character it approaches some of the Neptuneæ, but its high spire and strongly costate whorls show that it is more nearly allied to the true *Fusus*.

E. KERRI, Gabb. Pl. 28, fig. 43. Cretaceous, *N. Carolina*.

Subgenus EXILIA, Conrad. Shell very narrow, costate, spire subulate, canal long and narrow.

E. PERGRACILIS, Conr. Pl. 28, fig. 44. Eocene, *Alabama*.

Scarcely distinct from the typical Fusæ. *Exilifusus*, Conrad (non Gabb), is evidently a synonym.

E. THALLOIDES, Conr. Pl. 28, fig. 45. *Claiborne, Alabama*.

Genus TURRISPIRA, Conrad. Has not been characterized, and does not seem to differ from *Fusus*.

T. SALEBROSA, Conrad. Pl. 28, fig. 46. Eocene. *Alabama*.

Genus PRISCOFUSUS, Conrad. Founded on *Fusus geniculus*, Conrad, a very poorly preserved or figured fossil ; the type has "been lost for twenty years. The species is wholly unrecognizable, and should be expunged from nomenclature. For this rubbish Mr. Conrad has proposed a genus *Priscofusus*, but with neither figure nor diagnosis."—*Dall, Proc. Calif. Acad.* 1877.

F. GENICULUS, Conrad. Plate 28, fig. 47. Eocene, *Astoria, Oregon*.

Subgenus SERRIFUSUS, Meek. Shell short-fusiform ; body volution large, and bi- or tricarinate, with carinæ more or less nodose ; spire and canal moderate, the latter bent and more or less twisted ; outer lip broadly but slightly sinuous in outline, between the upper carina and the suture.

S. DAKOTENSIS, Meek and Hayden. Pl. 28 figs. 48, 49. Cretaceous, *Dakotah*.

This form so much resembles the recent *Fusus* (*Hemifusus*) *proboscidiferus*, Lam., that it might well be considered a fossil form of the same group.

SCALASPIRA, Conrad. This uncharacterized Miocene genus is figured by me (Manual, Vol. 2, pl. 70, fig. 431) as a possible synonym with *Urosalpinx*. It *may* be a *Fusus*, however.

Sub-Family FASCIOLARIINÆ.

Subgenus TEREBRISPIRA, Conrad. Shell of medium size, with spire much produced and canal short; volutions convex, angular, and strongly spirally ridged; plaits of columella not exposed externally; outer lip internally sulcated.

T. ELEGANS, Emmons. Pl. 29, fig. 50. Miocene, *Alabama*.

Subgenus MESORHYTIS, Meek. Shell agreeing nearly with *Peistocheilus* in form, but with plaits of columella stronger, comparatively little oblique, and exposed directly opposite the middle of the aperture; surface with fine spiral striæ, and vertical costæ.

M. GRACILENTA, Meek. Pl. 29, fig. 51. Cretaceous, *Yellowstone River*, 150 miles from its mouth.

Has the folds of a *Mitra*, rather than a *Fasciolaria*, and Meek refers it with considerable doubt to its present position.

Subgenus CRYPTORHYTIS, Meek. Shell generally under medium size, with volutions convex, but constricted above, and provided with regular vertical costæ or small folds; plaits of the columella very oblique, not exposed in a direct view into the aperture, and occupying a higher position than in the typical group; outer lip smooth within.

C. CHEYENNENSIS, Meek and Hayden. Pl. 29, fig. 52 (from a cast). Cretaceous, *Dakotah*.

Subgenus LIROSOMA, Conrad. Subpyriform; ribbed, beak narrow and produced, slightly recurved; one long, very oblique plait at the angle of the columella.

L. SULCOSA, Conrad. Pl. 29, fig. 53. Miocene, *Maryland*.

Its pertinence to this genus is very doutful.

Genus FASCIOLINA, Conrad. Fusiform; columella nearly straight to the extremity of the beak; one prominent oblique fold on the columella, situated above the middle of the aperture.

F. WOODII, Gabb. Pl. 29, fig. 52. Miocene, *New Jersey*.

The only figure does not exhibit the aperture, but Conrad states that the fold is situated more remote from the beak than in any other genus except *Cuma*.

CORDIERIA, Rouault. This genus is synonymous with *Borsonia*, and is a member of the family Pleurotomidæ. Conrad, however, has referred fossil Fasciolariæ to it.

WHITNEYA, Gabb. Pal. Calif., I, 205.

This is said by its author to have some resemblance to *Fasciolaria;* I have referred it to Purpurinæ, as a distinct generic group related to *Melapium*. See Manual, Vol. II, p. 214, pl. 68, fig. 397.

Sub-Family FUSINÆ.

Genus **FUSUS**, Lam.

Shell fusiform; spire long, acuminate, many whorled; aperture oval, usually striate within; outer lip simple; columella smooth; no umbilicus; canal long and straight. Yellowish brown or light horn-color, sometimes with red brown strigæ or spots; never banded. Operculum ovate, acute, with apical nucleus.

The genus as above defined, includes a considerable number of species very closely related in form, sculpture and color. The chief discriminative characters used are the proportions of diameter to length of shell, the longitudinal ribs and revolving striæ, the presence or absence of a shoulder on the whorls and of tubercles. Having examined extensive suites of specimens from single localities I find so much variation in all these respects that I am somewhat at a loss how to treat the species. I much fear that the number of specific forms, which, for want of actual demonstration to the contrary, I must leave intact, will eventually have to be greatly reduced when more material shall render possible a more philosophic consideration of the specific characters. The genus, as restricted to the spindle-shaped forms, is sub-tropical in distribution—the northern species usually described as *Fusus* by the older conchologists being now more correctly referred to the family Buccinidæ.

1. *Shell with periphery carinate and tuberculate.*

a. Tubercles produced, spinous.

F. PAGODA, Lesson. Pl. 32, fig. 86.

Shell yellowish brown. Length, 2·5 inches.

Near Kiusu, Corea; in 14 fathoms.—Belcher, Adams.

The spinose shoulder and the additional lower angle, with the short-spined lateral riblets on the canal distinguish this species sufficiently from all others. *Fusus Japonicus* Gray, according to the description must be identical with it.

F. VAGINATUS, Jan. Pl. 32, figs. 87, 88.

Yellowish brown; the spines of the shoulder terminating in longitudinal laminæ. Length, 1 inch.

Coasts of Provence, Sicily, Ægean Isles.

A rare species, inhabiting deep waters. It is found fossil in the miocene and pliocene of the adjacent countries.

b. Tubercles compressed; not ribbed.

F. PROBOSCIDIFERUS, Lam. Pl. 32, fig. 93.

Yellowish brown, covered by a light brown epidermis.

Length, 8 to 12 inches.

Australia.

This species is remarkable for its shelving shoulder, forming a conical spire with flat sides, for the ridge at the angle of the shoulder, which on the body whorl is only slightly or not at all tuberculate, for the absence of longitudinal ribs, and for the separation of the lip from the canal, forming a long, narrow, umbilical channel. It is an aberrant form which I have been tempted to place in *Hemifusus*, or to make it the type of a new genus. Dr. Binney identified this species with *Murex Aruanus*, Linn., which is exceedingly questionable, as that name is usually cited for a very different shell belonging to the genus *Fulgur*. It appears to me to be more advisable to retain Lamarck's well-known name.

F. VENTRICOSUS, H. Adams. Pl. 32, fig. 94.

Yellowish white. Length, 130 mill.

D'Agulhas Bank, Cape of Good Hope.

Evidently related to the preceding species and showing even more clearly than it does the separation of the inner lip from the columella. Kobelt has changed the name to *Adamsii*, because the original specific name is preoccupied by Beck and Gray, but as I do not adopt either of these in the genus, I retain Adams' designation.

c. Tubercles compressed, shell ribbed longitudinally.

F. COLUS, Linn. Pl. 32, figs. 89–92, 95.

White, the upper whorls of the spire and a part of the canal stained with brown; periphery sometimes brown-banded between the nodules. Length, 6 to 7 inches; diameter 1·5 inches.

Ceylon, Tonga Tabou.

Var. TOREUMA, Martyn (fig. 95), is distinguished from the typical form only by being more highly colored. The shell is yellowish brown, with chestnut-brown between the tubercles on

the periphery and the rest of the surface irregularly longitudinally streaked and clouded with the same color.

F. Nicobaricus, Lam. Pl. 32, figs. 98, 97, 96; pl. 33, fig. 99.

Shell very like *F. colus*, var. *toreuma*, but stouter and more coarsely sculptured, the ribs being rounded, and duplicating the nodules of the shoulder. Length, 5 to 6 inches.

Japan, Philippines.

F. oblitus, Reeve (fig. 97), appears to be the same.

Var. Beckii, Reeve. Pl. 33, fig. 99.

Only differs in being denuded of epidermis; white, without any fuscous markings.

Var. Brenchleyi, Baird. Pl. 32, fig 96.

A little shorter and proportionally wider than the type, the revolving ridges more irregular and consisting of two to four striæ combined, the coloring more closely disposed and deeper.

Length, 3·5 inches.

I suspect that this is founded on a single specimen and that the characters are individual only, and would gradually change into those of the type, if a series should be examined. I have not seen the specimen.

F. laticostatus, Desh. Pl. 33, fig. 101.

Profusely strigated with chestnut-brown; heavier and wider than *F. Nicobaricus*, the revolving ribs wide and flattened.

Length, 5 inches.

Ceylon.

Perhaps only a variety of the preceding species.

F. Virga, Gray.

"Shell fusiform, elongate, solid, white, apex yellowish; spire acute, two-thirds the length of the mouth; whorls rounded, convex, regularly and strongly longitudinally plaited, with alternate broad, sharp-edged and very fine spiral ribs; suture distinct; mouth ovate; throat grooved; outer lip crenulated; canal elongated, tapering, transversely striated, smooth in front.

Length, 5 inches.

Hab. China; not uncommon.

Compare with *F. laticostatus*, Desh., but the ribs are not broad and depressed. The nucleus of this species, as in most of the

genus, is quite smooth, sub-cylindrical, blunt, of one whorl and a half; the periostracum thin, pale brown, hairy."

The above description is all that is known of the species; it does not seem to convey any really distinctive characters from several other well-known species. It has not been figured.

F. TUBERCULATUS, Lam. Pl. 33, fig. 100; pl. 34, figs. 110, 111.

White, coarsely sculptured with revolving rounded ribs, the angle of the shoulder somewhat distantly tuberculated, and the interstices chestnut-brown. Length, 4·5 inches.

Red Sea, Indian Ocean.

This shell has a shorter spire and canal and is wider in proportion than *F. Nicobaricus*, of which, however, it may be only a variety. M. Tapparone-Canefri has given this species the name *F. maculiferus* because of the prior use of the specific name by Chemnitz for another species, but as that author was not binomial, his descriptive phrase being "F. tuberculatus seu muricatus," Lamarck's designation can stand.

Var. NODOSOPLICATUS, Dunker. Pl 34, figs. 110, 111.

Shell larger, more prominently nodose, unicolored. Length, 5·5 inches. *Japan.*

Lischke figures a variety (fig. 111) of this form, which not only approaches the next species but, in its obsolete carinæ, connects it also with a different group of Fusi.

F. LOEBBECKEI, Kobelt. Pl. 34, fig. 112.

Greyish white, spire somewhat stained with yellow. Length, 106 mill.

Hab. unknown.

Described from a single, somewhat worn specimen.

F. PERPLEXUS, A. Adams. Pl. ~~35~~ 33, figs. 102–107.

Shell white or yellowish, with or without chestnut markings, rather thin. Typically the shoulder and nodules are well developed, but they gradually disappear in a series of individuals until in some forms they are entirely absent, and the body-whorl is rounded and simply sculptured with revolving striæ. This extensive range of variation, fully established by the admirable figures of Lischke's *Fusus inconstans* (as above), not only suffices

for the suppression of this species but, if a similar variability in the other forms be assumed, it would almost reduce the oriental Fusæ to a single species. I do not think that science will be advanced by a radical reduction of these species at present: on the other hand, whilst *perplexus* has no real claims to recognition as a species, yet to suppress it would be to refer its various forms to several different species, although they are very evidently mere modifications of growth of a single species. Under these circumstances I let it stand. *F. perplexus* has not been figured, but Mr. E. Smith, of the British Museum, finds no difference between specimens of it and the figures of *Fusus inconstans*, Lischke, a species published four years later.

Length, 3 to 5 inches.

Hab Japan.

F. MULTICARINATUS, Lam. Pl. 33, fig. 109.

Yellowish white. Length, 4·5 to 5 inches.

Red Sea.

The species figured by Reeve under this name is not angulate and much resembles *F. turricula;* it has been separated from *multicarinatus* by Philippi and Tapparone-Canefri and is called *F. Reeveanus* by the former; it is a synonym of *Fusus spectrum*, Adams and Reeve.

F. AUSTRALIS, Quoy. Pl. 34, figs. 113–119.

Brownish red, or yellowish with chestnut spots or narrow bands; periphery subcarinate but shoulder scarcely defined, rounded; upon the body-whorl the revolving striæ are frequently more prominent than the ribs, breaking up the latter into tubercles at their crossing. Spire and canal proportionally shorter than in the preceding species. Length, 3·75 inches.

Red Sea, Japan, Australia.

M. Tapparone-Canefri gives to this species the name of *F. tuberculatus*, Chemn., which cannot stand, as the descriptive phrase is "F. tuberculatus seu muricatus." He also refers to *F. verrucosus*, Wood (as of Gmelin), but the identification is doubtful. *F. marmoratus* (figs. 114, 115), Phil., *F. aureus*, Reeve (figs. 116, 117), and *F. crebriliratus*, Reeve (fig. 118), may be confidently placed in the synonymy of the species. *F. caudatus*, Quoy (fig. 119), is the young shell.

F. LONGISSIMUS, Gmel. Pl. 34, fig. 120.

Shell white, covered sometimes by a very light brown epidermis; angle of each whorl bearing about ten rather large, compressed nodules. Length, 7·5 to 9 inches.

Ceylon.

F. candidus, Gmel., appears to be the same species and has a prior position in the "Systema," although published on the same page; I use *longissimus* preferably because it was adopted by Lamarck, and the species is, consequently, much better known under that name.

F. UNDATUS, Gmel. Pl. ~~34~~ 35. figs. 121, 126.

Shell heavy, white; nodules more prominent, not compressed, and fewer than in *F. longissimus*, being 7 or 8 to the whorl; revolving striæ not so prominent. Length, 6 to 7 inches.

Central Polynesia.

This species resembles the preceding, but the characters given above will serve to distinguish it. It is a very ponderous shell, and has an obsolete angle on the periphery below the shoulder line, making the body-whorl somewhat biangulate.

F. similis, Baird (fig. 126), from New Caledonia appears to be the same species, only differing in having "about 10 or 11" nodules in the specimen described.

F. POLYGONOIDES, Lam. Pl. 35, figs. 127, 128.

Light brown, spotted and strigate with chestnut-brown; body-whorl distinctly biangulate; both angles nodulous, those of the shoulder the most prominent. Length 2·5 to 3·5 inches.

East Indies.

I figure two examples of this species, the proportions varying considerably. It is possible that the succeeding species may be only a very slim variety, yet I am inclined to consider it distinct.

F. LEPTORHYNCHUS, Tapparone-Canefri. Pl. 35, fig. 129.

Whitish, more or less strigated with reddish brown.

Length, 3 inches.

Red Sea.

See remarks under *F. polygonoides*, above.

F. STRIGATUS, Phil. Pl. 35, fig. 122.

White, sharply angulate at the shoulder; longitudinal ribs prominent, chestnut-brown. Length, 2 inches.

Red Sea? Australia?

M. Tapparone-Canefri thinks that this species approaches rather too closely to a variety of *F. polygonoides*, Lam.; he thinks *F. pauperculus*, Desh., may be the young of it.

F. GRADATUS, Reeve. Pl. 35, figs. 123–125.

Light yellowish or orange, the nodulous sculpture white. Shell distinctly shouldered, covered by coarse rounded longitudinal ribs, which are cut into compressed nodules by coarse revolving riblets. Length, 2 to 2·5 inches.

West Indies.

The species was described without locality, but the figure corresponds exactly with specimens of *F. Hartwigi*, Shuttl. (fig. 124), which were collected at the island of St. Thomas, W. I. *F. Paeteli*, Dunker (fig. 125), also described without locality, appears to be the same. The latter species is compared by Dunker with *F. strigatus*, Phil., with which, notwithstanding the differences he has pointed out, it is entirely too closely allied.

F. SCHRAMMI, Crosse. Pl. 35, fig. 130.

Subtranslucent, finely striated with revolving liræ; longitudinaly, tuberculately costate; with a median sharp angle or carina, appearing on the spiral whorls also. Yellowish, with an interrupted, pallid brown band. Length, 69 mill.

Guadeloupe, W. I.

This may possibly be the young of an extreme variety of the following species.

F. DISTANS, Lam. Pl. 36, fig. 131.

Whorls convex, carinate in the middle, and encircled by a row of compressed tubercles. Light yellowish brown, the raised revolving liræ darker, as are also the interstices of the tubercles. Shell stout but rather light in texture. Length, 5 to 6 inches.

Philippine Islands.

Murex ansatus and *versicolor*, Gmelin, are probably the same species, but I am unable to identify them positively. The following, however, can only be separated by locality, and by its usually more elate form—although some are exactly like *distans*. It may be advisable to treat it, for the present, as a variety.

Var. CLOSTER, Philippi. Pl. 36, fig. 132.

Spire usually more drawn out; sometimes uncolored beneath the light olive epidermis. Length, 6 to 7·5 inches.

Isl. of Margarita, W. I.

I have a fine suite of this form connecting it very completely with *F. distans*.

Var. DUPETITHOUARSII, Kiener. Pl. 36, figs. 133, 134.

Unicolored beneath the light olive epidermis; spire more elate than the type; upper whorls more or less tuberculate, the tubercles usually vanishing before the last whorl, although sometimes continued and forming an angle upon it; body usually well rounded, showing no distinct shoulder, encircled throughout with revolving ribs, no tubercles.

Galapagos Isles; W. Coast of Central America, N. to Acapulco.

Kiener's figure of this form (fig. 133) represents a shell quite similar to *F. distans*, and the collection of the Philad. Academy contains a similar specimen; ordinarily, however, the non-carinate form obtains, and such is represented by the figures of Valenciennes and Reeve. *Fusus Novæ-Hollandiæ*, Reeve, next described, is certainly very closely allied to this species.

F. SPECTRUM, Ad. and Reeve. Pl. 36, fig. 135.

Shell slim, graceful, unicolored, white under a light brown epidermis; spire whorls crossed by rounded ribs, which are evanescent on the body, the latter having a sharp carina of compressed tubercles, defining a shoulder. Length, 3 inches.

Eastern Seas; Japan.

Var. NOVÆ-HOLLANDIÆ, Reeve. Pl. 37, fig. 137; pl. 33, fig. 108.

Ribs continued over the body-whorl, obliterating the carina and shoulder. Length, 4 to 6 inches.

Australia.

F. multicarinatus, (non Lam., fig. 108) = *F. Reeveanus*, Phil., appears to be the same species.

Notwithstanding its slimmer form it is very doubtful whether this should be considered specifically distinct from the last species. *Fusus albus*, Philippi is, according to the description, a synonym of the variety.

F. TORULOSUS, Lam. Pl. 36, fig. 136.

Chestnut-brown, the nodules lighter and their interstices darker. Length, 6 inches.

Red Sea?

Perhaps more robust and more boldly sculptured as well as darker color than the average *F. distans*, yet scarcely distinct enough to be separated from it.

F. ASSIMILIS, A. Adams.

The description of this unfigured species will suit any species of the group, and it is said to resemble in form and sculpture the *F. turricula* except that the whorls are nodosely angulated.

China Seas.

F. AMBUSTUS, Gould. Pl. 37, fig. 138.

Shell yellowish, shaded with brown, so as to appear as if scorched; spire acute, whorls eight, angular, girdled with elevated threads, and having about eight varicose folds, which disappear on the lower part of the body. Aperture quite small, nearly semicircular; beak nearly straight, and with a very narrow channel. Length, 1·75 inches.

Mazatlan, Guaymas.

It is evident, from Gould's figure, that his species is a young shell, and I think that the adult is the *Dupetithouarsi* of Carpenter, which he considered equivalent to *Novæ-Hollandiæ* of Reeve. I have before me a pair of shells three inches long, from Cape St. Lucas, and identified by Carpenter as *Dupetithouarsi*, Kiener: they are narrower and more graceful than that species, however, and whilst sufficiently resembling an *ambustus*, also before me, except in much greater size, they cannot, on the other hand, be distinguished from *F. spectrum, var. Novæ Hollandiæ.* I have indicated the synonymy as it appears to me, but have not sufficient material to justify me in deciding the matter definitely.

Mr. W. H. Dall has examined a photograph from an original drawing of *F. tumens*, Carpenter, an unfigured species described from a very young individual, and identifies it with *ambustus.* The *ambustus* of Carpenter, Cooper and others = the following species.

F. CINEREUS, Reeve. Pl. 37, figs. 139–141.

Shell more or less shouldered; canal rather short; spire long. Ribs generally whitish; revolving liræ, alternately larger and smaller, cross the ribs, and the larger liræ are brownish; the interstices of the sculpture are brownish, sometimes variegated with white. Length, 20 mill.

Farallone Isles to *San Diego, Cal.; La Paz, L. Cal.*—Gabb.

Fusus luteopictus, Dall (fig. 140), is the shell which many Californian collectors have erroneously referred to *F. ambustus*, Gld., and which others have identified as *F. geniculus*, Conrad: the latter is a miocene fossil, the figure of which is not sufficiently good for recognition, the type lost. I do not doubt the identity of *luteopictus* with *cinereus*, which was described without locality, and as a *Turbinella*. *P. Taylorianus*, Reeve, (fig. 141), appears to be a worn, immature state of the same species.

F. DUNKERI, Jonas. Pl. 37, fig. 142.

White, with a brownish interrupted zone. Length, 20 mill.

Australia.

This is evidently a very much worn specimen and perhaps not adult; the locality, also, has not been confirmed by subsequent collectors. Dr. Philippi considered *F. Taylorianus*, Reeve, a synonym, but I do not think the condition of *Dunkeri* justifies a positive conclusion. If the two species be merged the adopted name will be *Dunkeri*, which has decided priority of publication.

F. CRATICULATUS, Brocchi. Pl. 37, figs. 143, 144.

Reddish brown, resembling *F. Syracusanus* somewhat in form and sculpture. Length, 31 mill.

Mediterranean; rather rare.

F. scaber, Lam. (fig. 144), is a synonym.

F. SYRACUSANUS, Linn. Pl. 37, figs. 145, 146.

Whitish, with usually the shoulders of the whorls chestnut-brown, as well as the canal, a median band of the same on the body-whorl. Length, 1·5 to 2·25 inches.

Mediterranean.

The form and coloring are remarkably similar in a number of specimens from various localities, now before me; yet a variety figured by Reeve (fig. 146), is larger, whorls rounded, without

shoulder, and unicolored. The dentition of this species was ascertained by Troschel to be fasciolarioid, on which account he founded for it a new genus, *Aptyxis;* it has more recently appeared, however, that an undoubtedly genuine *Fusus* and the only one of which the dentition has been hitherto examined, possesses the same type of dentition (see *F. inconstans*, Lischke, Pl. 25, fig. 1), so that *Aptyxis* cannot hold.

F. ROSTRÁTUS, Olivi. Pl. 37, figs. 147–150.

Yellowish to reddish brown, spirally corded with sharp, narrow ridges, which become prickly on the ribs, and form a sharp series of tubercles, defining a somewhat convex shoulder; interstices of the main ridges each provided with a smaller ridge and scabrous. Length, 1 to 1·75 inches.

Mediterranean; Canary Islands.

Rather common in deep water, from 20 to 100 fathoms, upon corals and rocks. Fossil, miocene and pliocene, South of Europe. I have described the fully developed form, with carina, but this is often obsolete, so that the contour of the body-whorl is almost regularly rounded. To the latter belongs Reeve's *F. fragosus*, (fig. 148), to the former his *F. cœlatus* (fig. 149), is certainly very nearly related.

F. CŒLATUS, Reeve. Pl. 37, fig. 149.

Whitish; sculpture sharp and delicate. Length, 2·25 inches.

Hab. unknown.

Except in its larger size it is not essentially different from *F. rostratus.*

F. BRUIJNII, Tapparone-Canefri.

Elongately fusiform, sub-umbilicate, reddish brown; spire elate, apex somewhat acute; whorls nine, convex, with impressed sutures, closely encircled with squamous liræ crossing nine or ten longitudiual ribs; rounded, the last whorl obscurely subangulate; aperture ovately-subquadrate, crenulate at margin of lip, sulcate within; lip and columella margined with a vivid reddish tint, otherwise white within; canal moderate, not equalling the spire. Length, 40 mill.

Papuan Islands.

Not figured, but compared with *Fusus constrictus*, Koch, a species which I have placed in the genus *Coralliophila* (Vol. II, p. 208). It is said to possess a narrower umbilicus and to differ in proportions and somewhat in color. Judging from the description I think it possible that *F. Bruijnii* belongs also in *Coralliophila*.

F. NIGRIROSTRATUS, E. A. Smith. Pl. 37, fig. 151.

Brownish, streaked with darker color between the plications, the revolving liræ whitish, the rostrum purplish black; aperture bluish or purplish within. Length, 50 mill.

Japan.

I know nothing of this species beyond the description and figure.

F. PHILIPPII, Jonas. Pl. 38, fig. 152.

Strigate with brown on a yellowish brown ground; white within.

Australia.

This species has not been recognized by local collectors, nor is it found in the Monographies: it is probably not a true *Fusus*.

2. *Shell with rounded shoulder, no distinct carina.*

This division is made to include a few species, which, so far as our information goes, do not become sharply angulate upon the shoulder; there is no marked demarkation, however, between it and the preceding group, because some of the latter, normally carinate, vary to rounded whorls without carina.

F. NOBILIS, Reeve. Pl. 38, fig. 153.

White; interstices of the ribs faint reddish brown.

Length, 10·5 inches.

Hab. unknown.

Too closely allied to the varieties of *F. distans*, Lam., having rounded whorls: the only differences being larger size, and perhaps a little more ventricose growth. The specimen figured is the only one known; a shell sent to me by a London dealer under this name, as from the island of Tortola, West Indies, proving to be identical in all respects with forms of *F. distans*, var. *closter*. *F. nobilis* much resembles *F. longissimus*, Gmel., also, in size and proportions.

F. TURRICULA, Kiener. Pl. 38, fig. 154.

Uniform yellowish white. Lentgh, 3·5 to 4·5 inches.

China.

This appears to be a pretty constant form, the ribs large and rounded and extending over the body-whorl; an inner lip is usually present in the larger specimens, presenting a well-defined edge, raised above the columella.

F. Pfeifferi, Phil. Pl. 38, fig. 155.

Brownish yellow. Length, 2 inches.

Hab. unknown.

I know nothing about the species, which is described, I presume, from a single specimen. Its validity is more than doubtful, as it has no characters to separate it from a half dozen other species.

F. Meyeri, Dunker. Pl. 38, fig, 156.

Uniform white. Length, 7 inches.

Hab. unknown.

Said to differ from *F. longicauda* by its larger size, larger and more rugose revolving ridges, slightly concave shoulder, etc. It seems to differ from *F. distans*, var. *Novæ Hollandiæ* only in the ribs not being continued over the body. It might well be considered a synonym of *both!*

F. longicauda, Bory. Pl. 38, fig. 157.

Yellowish white; epidermis brown, thin; apex and end of canal frequently brownish. Length, 5 to 6·5 inches.

Ceylon.

This is, perhaps, a *F. colus* without carina, or a *F. turricula* without ribs on the body-worl.

F. Couei, Petit. Pl. 38, fig. 158.

Yellowish-white. Length, 4 inches.

Hab. Gulf of Mexico.

The locality is as doubtful as the shell; if the former is incorrect, the species might well be merged in the preceding one.

F. gracillimus, Ads. and Reeve. Pl. 38, fig. 159.

Light chestnut-brown. Length, 3 inches.

Eastern Seas.

Very like *F. turricula*, Kiener, but more slender.

F. acus, Ads. and Reeve. Pl. 38, fig. 160.

Reddish brown; spiral grooves fine, close-set, peculiarly flatly excavated. Length, 1·65 inches.

China Sea, off Borneo.

The most slender and graceful of all the species of *Fusus*.

F. LACUSICAUDATUS, Hinds. Pl. 38, fig. 161.

Reddish brown; aperture contracted by an inward curvature of the lip. Length, 2·25 inches.

L'Agulhas Bank, Cape of Good Hope.

This is doubtless a monstrosity caused by some injury to the mantle of the animal. I have seen a number of similar instances of abnormal inflection in the lip in both marine and terrestrial mollusks.

F. KOBELTI, Dall. Pl. 39, fig. 162.

Whorls 7 or 8, with rounded ribs crossed by revolving ridges, alternately larger. The shell is white, under an ashy gray or greenish olivaceous epidermis, the alternate larger revolving ridges chocolate brown; spire moderately long, whorls well rounded; canal rather short, somewhat curved.

Length, 2 to 2·5 inches.

Catalina Island and *Monterey, Cal.*

As this species has not been figured hitherto, I give that of a beach-worn specimen (the best I have) from Catalina I. The shell has been confounded by some of the West Coast collectors with *F. ambustus*, Gld., but is a stouter species.

F. TENUILIRATUS, Dunker. Pl. 30, fig. 163.

Whitish, with light yellowish brown longitudinal strigations. Length, 3 inches.

Hab. unknown.

The gradual inferior contraction of the aperture, until it merges insensibly into the rather wide canal is the principal distinctive feature of this stout but probably immature shell.

F. RUDOLPHI, Dunker. Pl. 39, fig. 164.

Yellowish white, the revolving striæ light chestnut, crossed by longitudinal strigations or maculations of the same color.

Length, 3·5 inches.

Hab. unknown.

In the features of this species as well as in those of the following one, may be recognized some of the characteristics of the genus *Hemifusus*.

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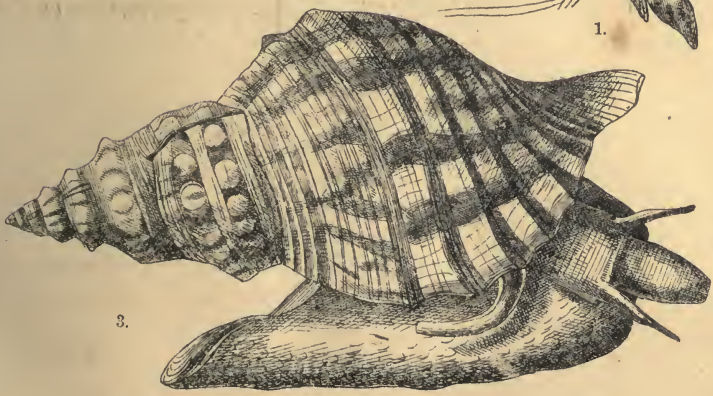

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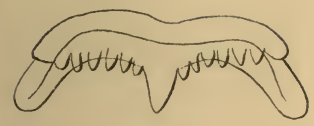

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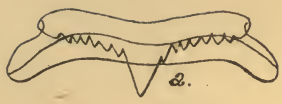

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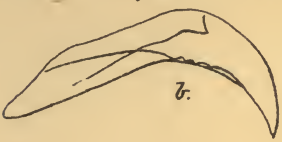

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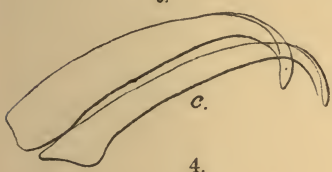

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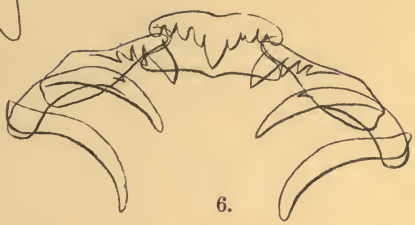

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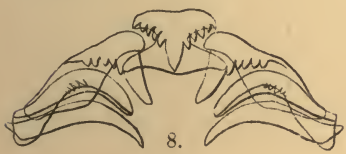

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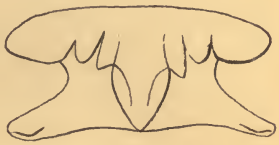

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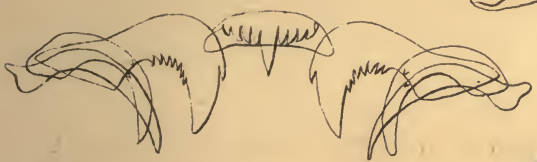

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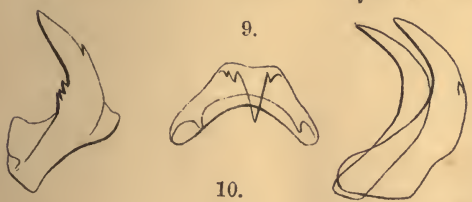

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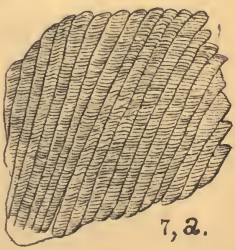

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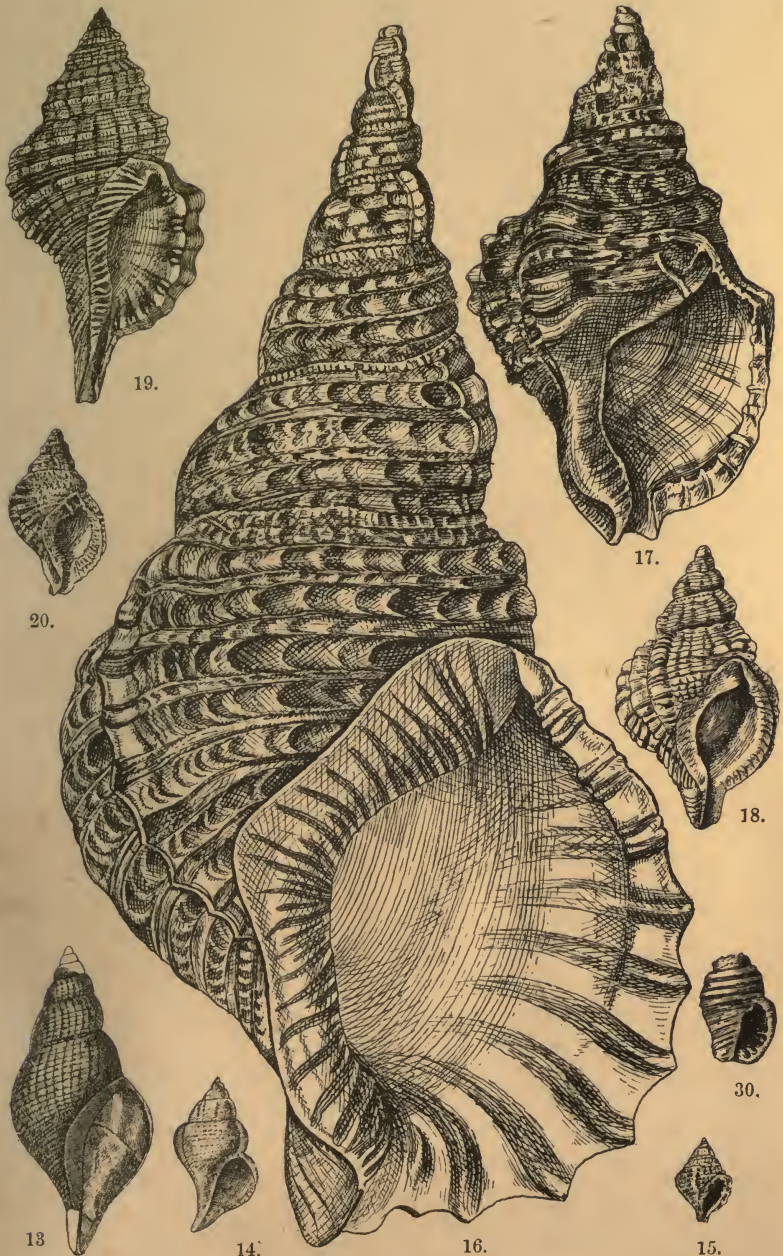
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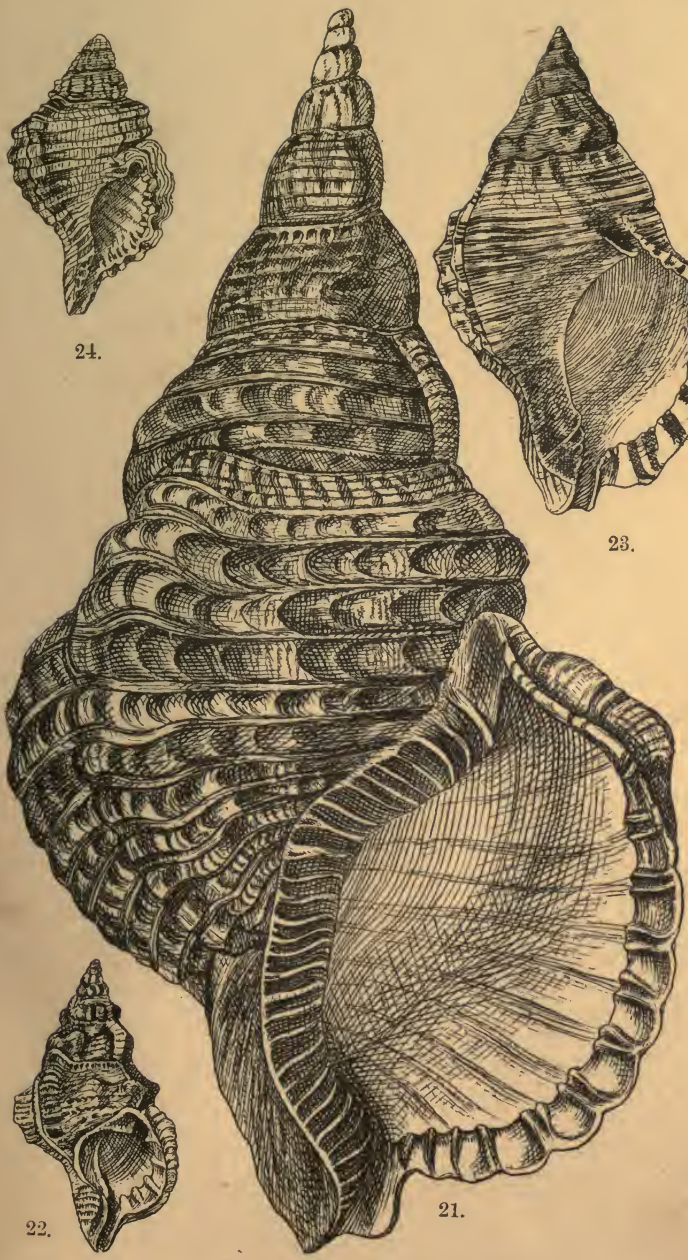

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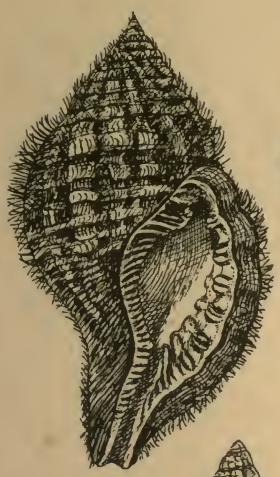

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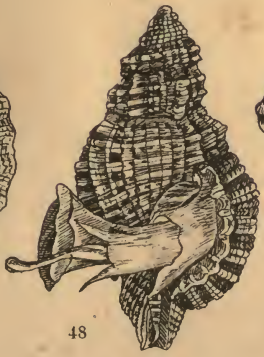

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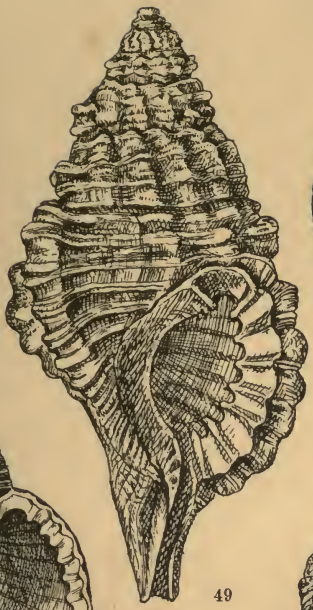

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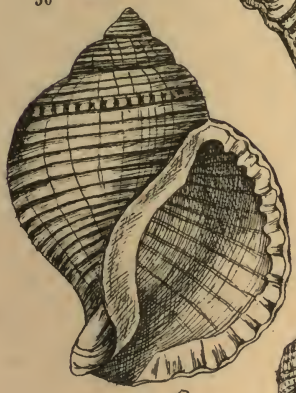

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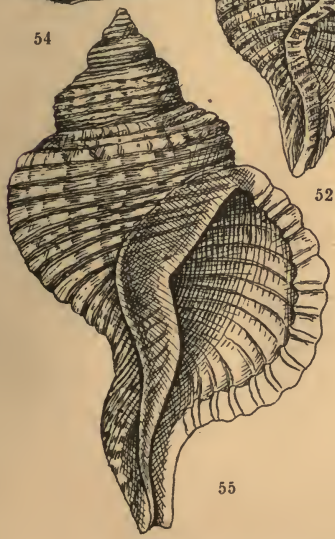

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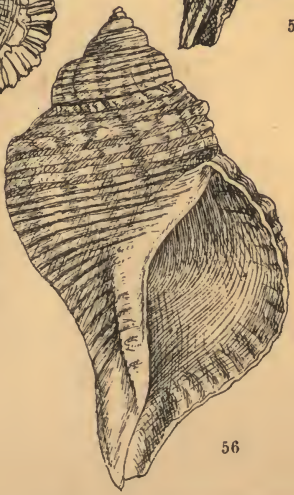

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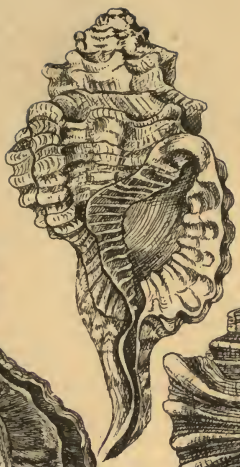

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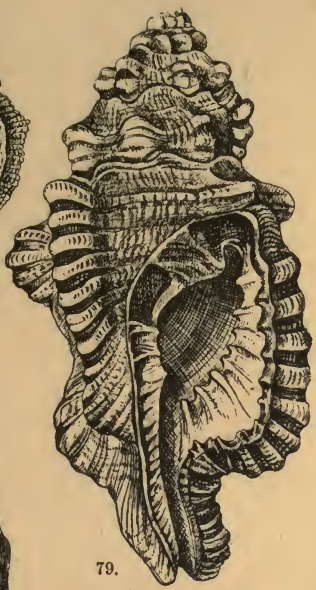

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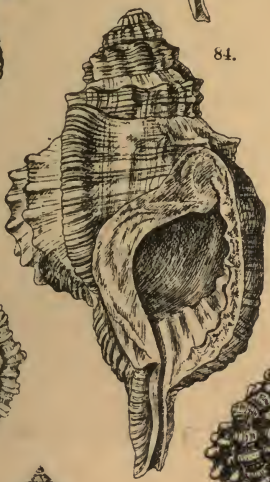

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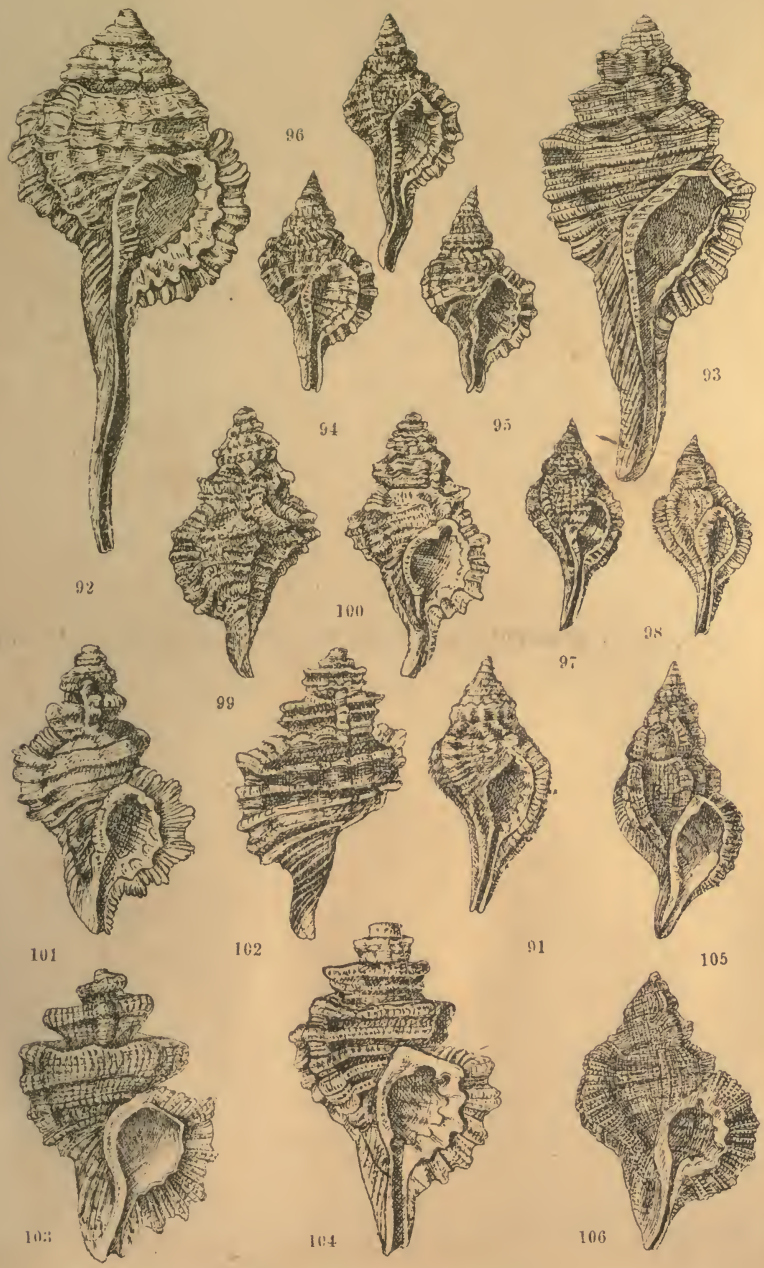
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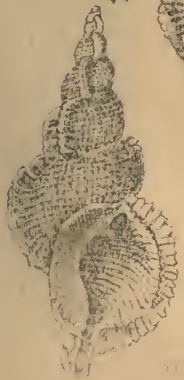

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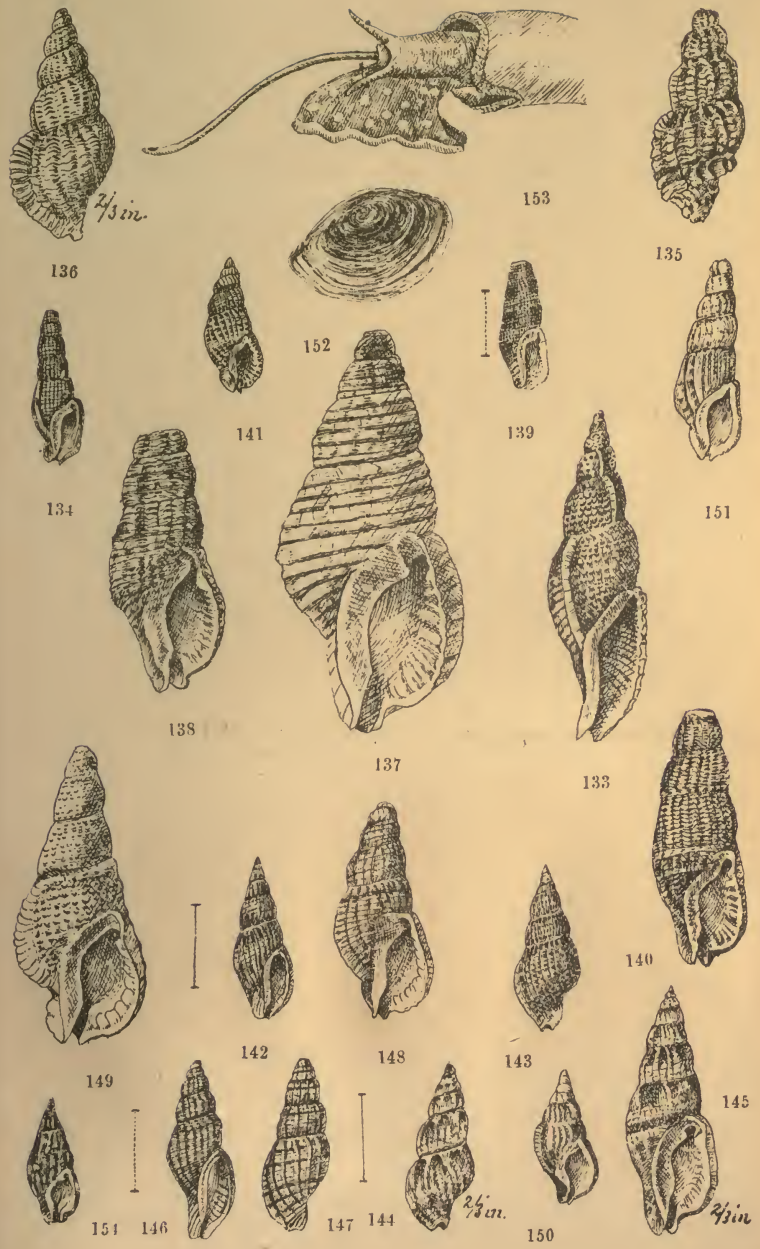
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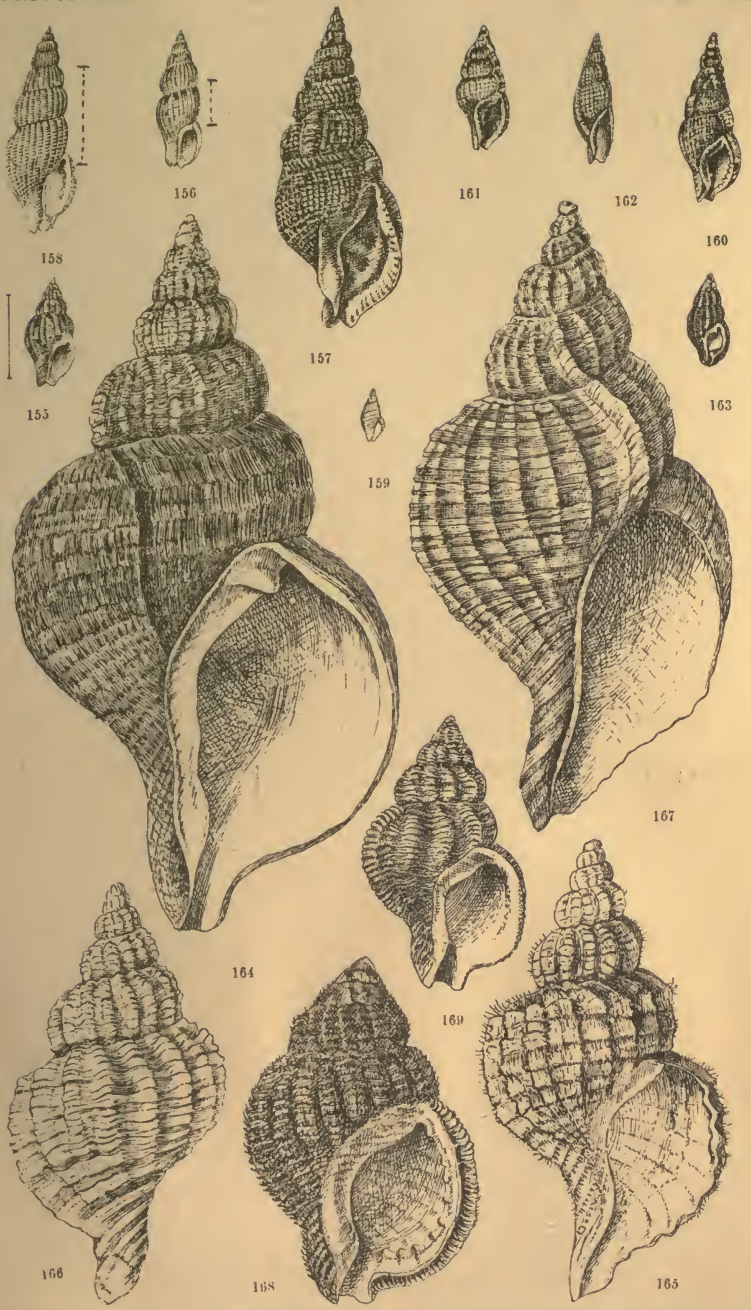
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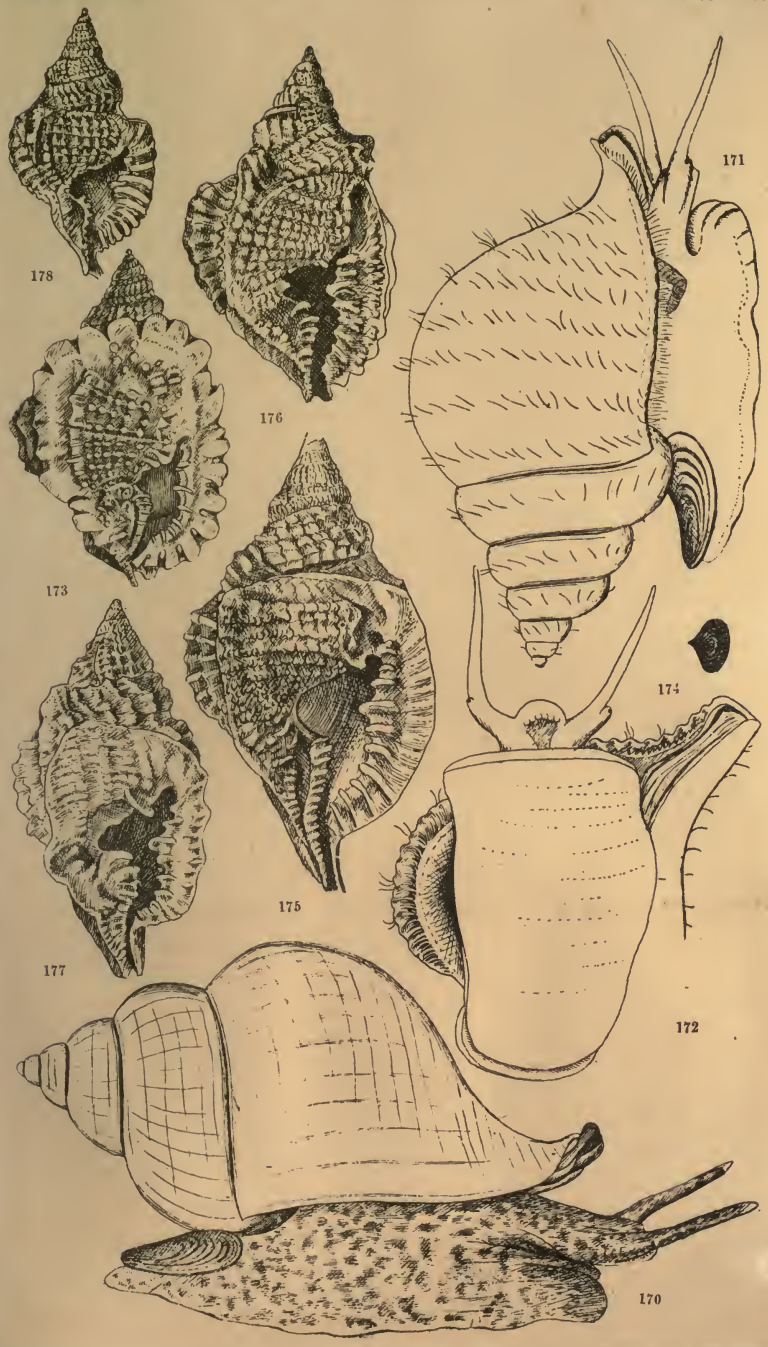
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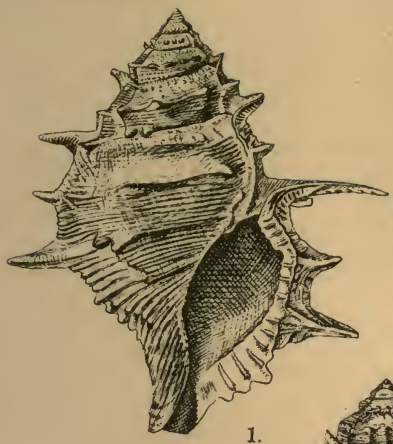

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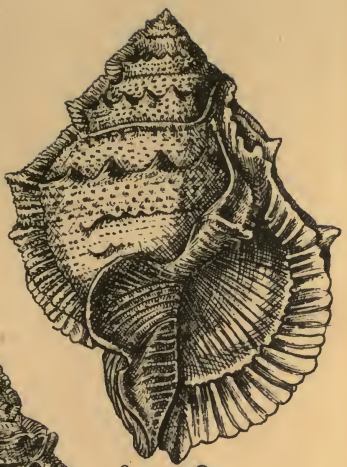

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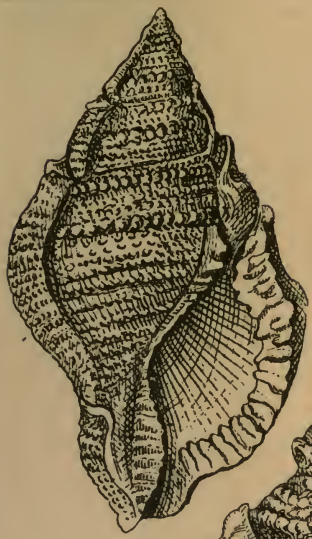

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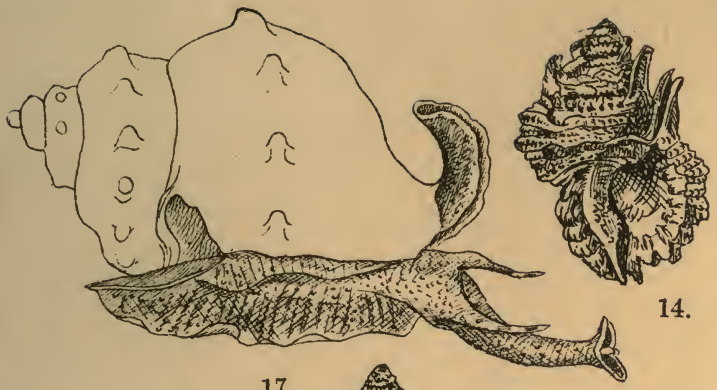

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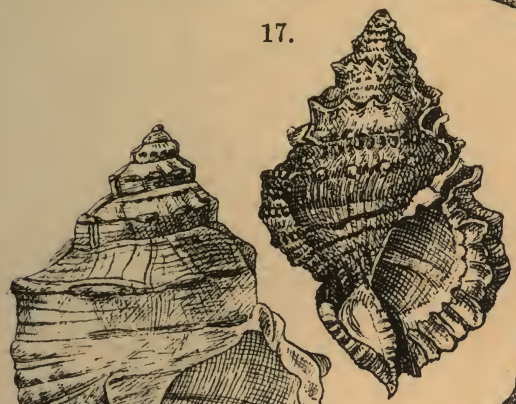

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F. OCELLIFERUS, Bory. Pl. 39, fig. 165.

Whitish, with pale yellowish brown, longitudinal strigations; revolving ribs rather broad and flattened, disposed to break up into tuberculations, and striate on the top; the inter-channels each with a single narrow ridge; whorls peculiarly appressed below the sutures; shell thin. Length, 4 inches.

East Indies?

F. MINUTISQUAMOSUS, Reeve. Pl. 39, fig. 166.

Longitudinally plicately ribbed, crossed by squamous fine ridges. Yellowish white. Length, ·75 inch.

Hab. unknown.

I am not acquainted with this species, of which Reeve has only given us a back view: it may be a *Coralliophila*, perhaps.

F. PULCHELLUS, Phil. Pl. 39, fig. 167.

Light chestnut-color, the longitudinal ribs dark chocolate, except upon the periphery, where they are tipped with white, forming an nterrupted band. Length, 22 mill.

Mediterranean Sea.

F. NIPONICUS, E. A. Smith. Pl. 39, fig. 168.

Whitish or yellowish, brown stained on the spine, and with a narrow brown band on the body-whorl; white within.
Length, 22 mill.

Japan.

Evidently immature, and very probably not a true *Fusus*.

F. SIMPLEX, E. A. Smith. Pl. 39, fig. 169.

White, under a smooth, grayish-olive epidermis.
Length, 18 mill.

Japan.

Certainly a very young shell; very probably its adult form has an older name.

F. RUBROLINEATUS, Sowb.

Shell rather short, light reddish, bifasciate with chestnut, distantly lineated with spiral red lines, thinly striated; spire rather short; whorls seven, marked with rather distant rounded ribs and spiral lines, with a wide chestnut band above; aperture sub-ovate, terminating in a sub-elongate canal.

Agulhas Bank, South Africa.

Not figured, and no dimensions given. The coloration precludes its being a *Fusus* I suppose, but the description does not indicate its true generic position.

F. USTULATUS, Reeve. Pl. 39, fig. 170.

Rusty brown; whitish within. Length, 2·75 inches.

Hab. unknown.

In the partial separation of an inner lip from the columellar margin of the canal, and in the canal being wide and open this species possesses characters which remove it from the typical Fusi and connect it with two shouldered species, *F. proboscidiferus* and *F. ventricosus*. It is possible that these may form a new generic group.

F. PYRULATUS, Reeve. Pl. 39, figs. 171, 172.

Yellowish brown. Length, 2·75 inches.

Van Dieman's Land.

Appears to be somewhat immature. I have not seen the species.

Subgenus **Sinistralia**, H. & A. Ad.

F. MAROCCENSIS, Gmel. Pl. 40, figs. 173, 174.

Yellowish white to light brown. Length, ·75 to 1 inch.

Isl. of Guadeloupe, W. Indies?

The ribs are not continuous to the sutures, below which a smooth space intervenes; in the smaller specimens this space is very narrow and thus may escape observation, but in better grown individuals it becomes wider and more marked. In the latter state Mr. Reeve has called the species *F. elegans* (fig. 174): a name which cannot stand even as a variety. The locality given is exceedingly doubtful.

Doubtful and Spurious Fusidæ.

F. LINCOLNENSIS, Crosse. Pl. 40, fig. 175.

Whitish, with a wide central brown band. Length, 19 mill.

York Peninsula, Australia.

The coloration and very short canal remove this species from *Fusus;* yet I do not know where to locate it. Resembles a *Muricidea.*

F. HEMIFUSUS, Kobelt. Pl. 58, fig. 397.

Locality unknown.

This species, published in the Conchylien Cabinet in 1880, came to me too late to insert in its proper position in the genus *Fusus*. It is precisely like *F. colus*, var. *Brenchlyi*, and is therefore a synonym.

F. LINEOLATUS, Costa. This is evidently not a *Fusus*. It is said to inhabit the Mediterranean Sea, but I do not find it in Weinkauff or Monterosato.

F. PUSILLUS, Pfeiffer. Probably a very young shell, if a *Fusus*, as it only measures two lines in length. It has not been recognized.

West Indies.

F. APERTUS, Carpenter. "The six specimens found of this species were either young or fragmentary." The length of the shell is one-tenth of an inch! Why will naturalists cumber the nomenclature with species founded upon such insufficient material?

F. MODESTUS, Gould. An unfigured shell, collected by the North Pacific Expl. Exped. in ten fathoms, shelly sand, at Hakodadi, Japan. The description is useless for recognition of the species, and the types were destroyed, I presume, in the great Chicago fire.

F. GILVUS, Phil. This may be a *Hemifusus*, as there is a perforate umbilicus. The species is from China, and has not been figured.

F. OBSCURUS, Phil. Pl. 40, fig. 176.

Nearly black, the upper part of the whorls, the keel, the tubercles and a central band on the last whorl are lighter.

Length, 1·65 inches.

Hab. unknown.

The color, the flexure of the columella, etc., are not typical of the genus, and would indicate some relationship to the *Peristerniinæ:* there is no mention made of columellar plaits, however. Is this possibly a discolored fossil?

F. NUCLEUS, Brod. Pl. 40, fig. 187.

Whitish. Length ·5, lat. ·33 inch.

Galapagos.

I do not know the species. It was described as a *Murex*, but neither belongs to that genus nor to *Fusus*—where it is placed by Sowerby, of whose figure I give a copy. Perhaps it is a very young *Coralliophila*.

F. UNICARINATUS, Phil. This unfigured and minute species from Magellan's Straits is certainly not a *Fusus*, but may be a *Trophon*. I have described it under that genus in Vol. II, p. 151.

F. SPIRALIS, A. Ad. This is a genuine *Fusus*, shouldered and spirally striate, about three inches in length. Inhabits New Zealand. *F. pensum*, Hutton, is a synonym, according to the latter author. Unfigured.

F. NODICINCTUS, A. Ad. *Australia.*
F. DILECTUS, A. Ad. *Venezuela.*
F. ALBINUS, A. Ad. *Ichaboe, W. Africa.*
F. SOLIDULUS, A. Ad. *Japan.*

F. SPICERI, Tenison-Woods. *Tasmania.*
F. LEGRANDI, Tenison-Woods. *Tasmania.*

F. NIVEUS, Gray. *Sierra Leone.*
F. GRANDIS, Gray. *Habitat unknown.*
F. GLACIALIS, Gray. *Arctic Ocean.*

F. VARIUS, Lam. *Australia.*
F. CREBRICOSTATUS, Lam. *Hab. unknown.*
F. RUBENS, Lam. *Isle of France.*

These three species are not figured by Kiener in his delineations of the Lamarckian types, and the descriptions have not been identified by any other conchologists.

F. VENTRICOSUS and F. EXILIS, Menke. *Australia.*

F. CHONETICUS, F. UMBILICATUS, F. BERNARDIANUS, F. CYGNEUS and F. NIGRINUS, Philippi.

F. umbilicatus is certainly *not* a *Fusus*, but the description does not indicate its generic position.

F. MURICOIDES and F. NITENS, C. B. Adams. *Jamaica.*

Both minute shells, and not true Fusi.

F. LINEATUS and F. MALSBURGIANUS, Menke.

The above, described in Menke's catalogue, are not now in his collection.—*Vide* Mal. Blatt, xviii, 127.

F. JAPONICUS, Gray. I have not been able to find any reference for this name.

The following numerous species, described by Anton, in his "Verzeichniss," have never been identified; they are mostly not true Fusi and will go into *Neptunea*, *Hemifusus*, or other related groups, judging from the diagnoses.

F. ROEDINGI and F. GIESEKII, Anton. No locality. Appear to be true *Fusus*.

F. SPLENDIDUS, Anton. Something like a *Turbinella* or *Fasciolaria*.

F. TRISKADEKAGONUS, F. AURANTIUS, F. HEXAGONUS ("inclines to *Turbinella*, still more to *Murex*"), F. GRANULOSUS (= *Turbinella?*), F. CIRCULUS, F. REMOTUS, F. CONICUS, F. VENTRICOSUS, F. CONTABULATUS, F. PUNCTATUS, F. ROSSMASSLERI, F. PLEUROTOMOIDES, F. MURICINUS, F. VARICOSUS, F. MONACHUS, F. ROSEUS (= *Purpura?*), F. ALBICANS (= *Turbinella?*).

Genus **AFER**, Conrad.

Conrad never characterized his genus; but he made *Fusus afer* of Gmelin the type of it. The fossil forms assigned by him to the genus are stated by Prof. Meek to be different from *F. afer*, and he refers them to Conrad's *Pyrifusus*. *Fusus afer* does not seem to have been very well understood by conchologists, the figure in Kiener looking like an immature shell, whilst that given by Reeve belongs to the Turbinellidæ.

I retain the genus, with great doubt, and refer to it a second species, which seems to have some resemblance to the type, and for which I have no other convenient place.

A. AFER, Gmelin. Pl. 40, fig. 177.

Light brown; aperture sillonated within and dentate at the margin, slightly channeled behind. Length, 1 inch.

Senegal.

A. BLOSVILLEI, Desh. Pl. 40, figs. 178–180.

Livid brown or bluish or pale yellow; sometimes the revolving ridges are brown; aperture orange or yellowish.

Length, 1·75 inches.

Red Sea; Ceylon; Bay of Manilla; rocky places at low water.

Fusus lividus, Phil. (fig. 180), is usually considered identical with this species.

Var. HEPTAGONALIS, Reeve. Pl. 40, fig. 181.

In this variety some of the longitudinal ribs coallesce, so that those remaining are not only fewer in number, but they are also wider.

Genus **CLAVELLA**, Swainson.

Only one recent species can be referred properly to this fossil genus, which is the *C. serotina*, the type of Hinds' genus *Cyrtulus*. The three other recent species referred to it by H. and A. Adams are members of other genera:

C. avellana, Reeve, is a *Cronia*. Vol. II, p. 180.

C. distorta, Reeve, belongs to the Pisaniinæ.

C. subrostrata, Gray, belongs to the Melongeniinæ.

C. SEROTINA, Hinds. Pl. 40, fig. 182.

Pale yellowish or flesh-color; within light rosy or white.

Length, 3·5 inches.

Nukahiva, Marquesas, in 9 fathoms, among sand.

A thick and heavy shell which would probably be equally well placed in Melongeniinæ; or in Turbinellidæ, as some specimens show incipient folds on the columella.

Genus **BUCCINOFUSUS**, Conrad.

The single recent species referred by Conrad to his genus has since been made the type of *Boreofusus*, Sars—which, of course, becomes a synonym. The dentition, only, separates this from *Sipho*, several species of which might be regarded as either identical, or varieties at most. When the lingual armature of these allied forms shall become known their definite position can be ascertained; at present I prefer to leave them all in *Sipho*.

Jeffreys thus describes the animal:

Body white or cream-color, with a slight tinge of flesh-color; mantle sometimes edged with brown; pallial tube extensile, occasionally protruded beyond the canal, with an expanded or trumpet-shaped opening; proboscis exceedingly long, measuring nearly two inches even when contracted after the death of the animal; tentacles conical, rather short, and close together, with

bluntly pointed tips; eyes small and black, seated on long stalks, about half way up the tentacles; foot lanceolate, thick, rounded and double-edged in front; tail either pointed or blunt and somewhat truncated.

B. Berniciensis, King. Pl. 40, figs. 183, 184.

Whorls encircled with alternately larger and smaller revolving ridges, decussated by fine growth-lines; lip margin slightly everted; shell thin, white, under a very thin, light olive epidermis. Length, 3 inches.

North Sea; French Coast, occasionally; *Circumpolar?*

Dredged in fine sand 78 to 690 fathoms. Jeffreys cites varieties *elegans*, *tener* and *inflata*. He says that "the young, when fresh-caught and living, look like tiny rosebuds." The color of full-grown specimens (especially of the inside) is not less beautiful; these may vie with

. . . . "The dappled shells
That drink the wave with such a rosy mouth."

Middendorff, Adams and Kobelt think that *F. Sabinii*, Gray, is the young of this species; if so, that name would have priority; but the species is unfigured, and doubtful. Jeffreys refers it doubtfully to *Sipho ventricosus*.

B. terebralis, Gould. Pl. 39, fig. 189.

Yellowish brown, columella tinged pallid rosaceous. Labrum effused. Length, 2·25 inches.

Spitzbergen.

If not identical with the preceding species, it is very closely allied to it. Gould's type had a broken lip, but he refers besides to a perfect specimen in the Cumingian Collection; this afterwards became the type of *Fusus Spitzbergensis*, Reeve.

Sub-Family PTYCHATRACTINÆ.

This group was distinguished as a family by Stimpson. The shell of *Ptychatractus* unites the form of a *Sipho* with the folds of a *Fasciolaria;* its small size, color, and northern habitat will distinguish it from the latter, even without taking into account the very diverse dentition; yet without the latter difference it would scarcely have been advisable to have separated the single species upon which the genus was founded from *Fasciolaria*.

Mr. Stearns has added a second species, which may not be distinct; and I place here (because I must place it somewhere) the *Fusus Coreanicus* of Mr. E. A. Smith.

Genus **PTYCHATRACTUS**, Stimpson.

P. LIGATUS, Mighels and Adams. Pl. 40, fig. 185.

Shell light reddish brown. Length, ·75 inch.

Coasts of Maine, Nova Scotia; Gulf of St. Lawrence; in deep water.

Operculum like that of *Fusus*.

P. OCCIDENTALIS, Stearns.

Shell elongated, fusiform, rather slender, whitish, traversed by narrow, revolving, brownish threads and much wider intervening spaces; suture distinct, spire tapering; aperture oblong-oval, about half the length of the shell; within white, polished; canal short, nearly straight; columella obliquely, not strongly plicated.

Length, ·75 inch.

Isle of Nagai, one of the *Shumagin Islands*. Forty fathoms.

More delicate than the Atlantic species, although the single specimen was not quite mature. This specimen having been mislaid, Mr. Stearns has not yet figured it. It must be considered a doubtful species for the present, as the description presents no features by which the shell can be positively distinguished.

P. COREANICUS, E. A. Smith. Pl. 40, fig. 186.

Whorls slightly longitudinally costate and encircled by about twelve revolving ridges, which are alternately smaller. Dirty, diluted flesh-color, the ribs stained with dark brown; fuscous within the aperture. Columella smooth, arcuate above, very oblique inferiorly; canal short, slightly retroverted.

Length, 22 mill.

Japan.

The evanescent ribs are sometimes indicated very obscurely on *P. ligatus*. Nothing is said about columellar folds, but these are sometimes not apparent on *P. ligatus*. The general form of the shell is so nearly that of *Ptychatractus*, that I do not know where else to place it with equal probability of giving it its correct position.

Genus **MEYERIA**, Dunker and Metzger.

The dentition of the problematical mollusk which has rejoiced within the short period of our scientific knowledge of it under so many names, appears to relate it somewhat to *Ptychatractus*, and I prefer to place it in the same sub-family with that shell, rather than make a new family for it. Norman shows that *Meyeria* is pre-occupied by McCoy for a genus of fossil crustaceans, and he therefore proposes the generic name *Metzgeria;* but I see no advantage (and much disadvantage) in changing names because they happen to have been previously used in some other department of zoology.

M. ALBA, Jeffreys. Pl. 39, figs. 190–193.

Fusiform, dirty white; whorls six or seven, moderately convex, suture distinct; longitudinally plicately costate, crossed by revolving striæ; lips smooth, columella twisted, very obsoletely biplicate; canal somewhat twisted, open.

Length, 18 mill.

Faroë Isles; North Sea; Norway.

Prof. G. O. Sars makes this name a synonym of *M.* (*Tritonium*) *pusilla*, M. Sars (figs. 191, 192); but the latter name, given in 1858, was neither accompanied by diagnosis, distinctive characters, nor figure. I therefore cannot adopt it.

Sub-Family FASCIOLARIINÆ.

Genus **FASCIOLARIA**, Lam.

The animal of *Fasciolaria* does not differ essentially from that of *Fusus*, nor do we find very much difference in the shells; the usually shorter spire, more swollen body-whorl, wider and shorter and flexuous instead of straight canal, and the oblique plaits near the fore-end of the columella, are the chief distinguishing characters. Between *Fasciolaria* and *Fulgur* the resemblance is much closer, and, until the dentition of the two groups became known, they were placed close together by systematists; in *Fulgur*, however, the scarcely apparent folding of the columella is single, whilst in *Fasciolaria* it is double, sometimes triple. The *Peristerniinæ* have columellar folds, but these are usually more transverse, are situated higher on the columella, and the shells are much smaller; indeed one of the characteristics of the

Fasciolarias is the comparatively large size of the species. The distribution of the genus is tropical and sub-tropical, in shallow waters. But few living species are known, to which may be added some fossil forms, commencing with the cretaceous. The operculum is more claw-shaped than that of *Fusus*, and is rather large, filling the aperture.

I have figured the nidimental capsules of *F. tulipa*, Linn., in Vol. II, Pl. 7, figs. 77, 81.

* *Shell not nodulous or shouldered.*

F. TULIPA, Linn. Pl. 59, figs. 1–5.

Color white or bluish-ash or orange, irregularly mottled with orange, chestnut or chocolate; encircled with chestnut-brown narrow lines, which are sometimes engraved. Aperture and columella blush or orange, with revolving lines of chestnut within. Length, 4 to 8 inches.

West Indies, Southern Atlantic Coast of United States, from N. Carolina, southwards.

Krebs found it in two to six feet of water, on sand and small stones, where *Algæ* are growing, and where the sea is calm.

The color-varieties are very numerous, including, not frequently, one of a uniform dark mahogany, with black revolving lines, and the following, which has been usually accepted as a distinct species, and may be retained as a variety.

Var. DISTANS, Lam. Fig. 5.

The revolving colored lines are less numerous than in the type, the more prominent ones, to the number of about a half-dozen, being retained on the body-whorl, whilst the intermediate ones are absent. The shell does not usually grow to such a large size as the typical form. Inhabits the same localities. In the numerous specimens before me, I have abundant evidence that the variety originates from the type, in the unbroken series of intermediate stages of coloration. I figure a rugose form which Dunker intended at one time to describe as *F. Scheepmakeri*, but finally illustrated in his "Novitates" as a variety of *F. tulipa* (fig. 3).

F. canaliculata, Valenciennes, described as from Acapulco, Pacific Coast of Mexico, has never been figured nor positively

identified. Carpenter remarks upon the resemblance of the description to *F. tulipa;* I have but little doubt that it should be considered a synonym, and that the locality is erroneous.

** * Shell shouldered, but not tuberculate.*

F. LUGUBRIS, Reeve. Pl. 59, figs. 6, 7.

Fleshy-brown, covered with a dark olive-brown epidermis. Length, 2·5–3 inches.

Cape of Good Hope.

F. badia, Krauss (fig. 7), described a year subsequent to *F. lugubris*, and from the same locality, is evidently synonymous.

** * * Shell shouldered and tuberculate.*

F. PRINCEPS, Sowb. Pl. 60, figs. 11, 17.

Nodulous on the shoulder, distantly spirally ridged, interstices concave, spirally striate. Light orange, covered with a persistent chestnut-brown epidermis; columella and interior of aperture orange, the latter with close, revolving, raised red lines, which sometimes tend to separate into groups resembling music staves. Length, 6–9 inches.

Panama to Mazatlan; Peru ?

P. P. Carpenter describes the operculum as "pyriform, apex terminal; outside with about five longitudinal furrows on the middle and interior; exterior with irregular diagonal ribs; inside with very large attachment, not corrugated." *F. Reevei*, Jonas (fig. 17), is a poor, faded *F. princeps*, although it is stated in Küster to be "himmelweit" in its characters.

F. GIGANTEA, Kiener. Pl. 60, figs. 14–16.

Shell yellowish-white, covered with a chestnut-brown epidermis; flesh-color or yellowish within the aperture; tubercles distant, large. Length, 1 to 2 feet.

South Carolina; West Indies, Brazil.

This is the largest known species of univalve shells. *F. papillosa*, Sowb. (figs. 15, 16), appears to be the young: it has priority, but Kiener's name is so well known that I let it stand.

F. FILAMENTOSA, Lam. Pl. 59, figs. 8–10; Pl. 60, figs. 12, 13.

Bluish-white, variegated and streaked with red, brown or orange, the spiral grooves dark chestnut or blackish. Aperture

blush or yellowish, with close, raised, red revolving lines, each pair of which terminates in a marginal denticle.

Length, 4–6 inches.

Red Sea; Ceylon; Philippine Is.; Australia; Central Polynesia.

F. ferruginea, Lam. (fig. 12), is only a slim form of this species, in which the nodules are scarcely apparent. Occasionally there are no nodules, the shell being scarcely shouldered: this state has been described by Jonas as *F. inermis* (fig. 13).

F. FUSIFORMIS, Valenciennes. Pl. 61, figs. 18, 19.

Upper whorls rudely, plicately ribbed, lower whorls with revolving striæ or ridges only. Epidermis brown, under which the shell is light brown. Length, 3–4 inches.

So. Australia; in grass wrack, 2 to 5 fathoms.

I doubt whether this is more than an extreme form of the preceding species.

F. AURANTIACA, Lam. Pl. 61, figs. 20, 21; Pl. 63, fig. 33.

Rugose, tuberculate on the shoulder, with occasional swollen tubercles elsewhere on the body-whorl; spirally grooved, the grooves generally in pairs. Mottled reddish-orange and white, under an olive or purple epidermis; white within.

Length, 3–5 inches.

Coast of Brazil? Cape of Good Hope?

Both localities are somewhat uncertain. The species is wider, but closely allied to *F. filamentosa*, a few specimens of which have a tendency to tuberculation below the shoulder, in the same manner as in *F. aurantiaca*. *F. purpurea*, Jonas (fig. 27), is founded apparently, on a specimen with epidermis. *F. Persica*, Reeve, = *clava*, Jonas (fig. 33), is founded on the very ponderous, adult form.

F. CROCATA, Phil. Pl. 61, figs. 22, 23.

Shell yellowish, the revolving, elevated lines lighter in color. Length, 3–4 inches.

Yucatan; Guiana.

The original figure and description (fig. 22) are from a young shell; that of Küster (fig. 23) represents a more mature specimen. The nearest species appears to be *F. filamentosa*—which is from an entirely different habitat. This species does not

appear in the Swift West Indian Collection, and I have, therefore, some slight doubt of the correctness of the localities.

F. TRAPEZIUM, Linn. Pl. 61, figs. 24–26; pl. 62, figs. 27, 28.

Thick, ponderous; whorls slanting on the shoulder, armed with a row of tubercles, which, in old specimens, become large and thick. Flesh-color, beneath a yellowish brown epidermis, encircled by brown, engraved lines, which are approximated in pairs; aperture flesh-color, with revolving brown, raised lines.

Length, 4–8 inches.

Philippines; Java; China; Red Sea; Auckland Is.?

Among the forms of this species several have received specific names; among these I figure *F. Lischkeana*, Dunker (fig. 27), a rather smooth form, the nodules not being developed; *F. Audouini*, Jonas (figs. 24, 25), which is somewhat more slim than the type, and differs somewhat in color. *F. ponderosa*, Jonas (fig. 28), which, at first sight, appears sufficiently distinct, I am able to connect with the typical form by intermediate stages;—it is very ponderous, the tubercles projecting outwards like spines from the angle of the shoulder.

F. HEYNEMANNI, Dunker. Pl. 62, fig. 29.

Flesh-color, under a yellowish olive epidermis.

Length, 3·5 inches.

Natal, So. Africa.

Evidently described from a worn specimen: it is very doubtful whether it has any good claim to recognition as a species.

F. CORONATA, Lam. Pl. 63, figs. 34, 30.

Light yellowish brown or flesh-color, under a thin, olive-brown epidermis. Length, 4–7 inches.

Philippines; Australia; Tasmania.

The spire is longer, the tuberculations closer, and consequently more numerous than in *F. salmo*, Wood; and perhaps the shell is not quite so heavy: but these are differences of degree only, and sometimes a *F. salmo* is met with which very reasonably fulfils the above bill of particulars. There is a wide difference of locality between the two forms, and I therefore allow them both to remain for the present, but with considerable desire to merge them under the name of *F. coronata*.

F. SALMO, Wood. Pl. 62, figs. 31, 32, 35.

Light flesh-color or yellowish, the very thin epidermis yellowish brown; aperture flesh-color. Length, 4–5 inches.

Panama to W. Coast of Mexico.

The spire is short, giving the species very much the appearance of a *Busycon* or *Fulgur*.

Var. GRANOSA, Brod. Fig. 32.

Still larger, measuring 5–7 inches. Edge of aperture and columella tinged with orange. Epidermis darker colored, covered with black granulations.

Gray states that the animal of *F. salmo* is bright red. See remarks under preceding species.

F. Valenciennesi, Kiener (fig. 35), is a *F. salmo* with the nodules but slightly developed.

F. LIGNARIA, Linn. Pl. 63, figs. 36, 37.

Whitish or yellowish, sometimes with brown bands; brown tinted within the aperture. Epidermis olive-brown.

Length, 2 inches.

Mediterranean Sea.

This species has a rude, solid growth, usually appearing as if water-worn; the sculpture being somewhat rounded and indistinct.

F. RUFA, Reeve. Pl. 33, fig. 38.

Reddish brown, interior white; revolving ridges indistinct or lost, except upon the ribs. Length, 2·25 inches.

Philippines.

Described as a *Fusus*, but the strong resemblance of Reeve's figure to the foregoing species induces me to place it here.

Unidentified and Doubtful Fasciolariæ.

P. SULCATA, Lesson. *Acapulco.*

F. RUGOSA, Val. *Acapulco.* A young shell; perhaps *Latirus*.

F. SULCATA, TUBERCULATA and MAGNA, Anton. Like most of Anton's species, these have never been identified.

Sub-Family PERISTERNIINÆ.

Kobelt, in Küster's Conchylien Cabinet, has divided the species among the several generic groups, and arranged them in accord-

ance with their relationships. I have mainly followed this arrangement, although it is certainly far from perfect. The difficulty is, that whilst the genera hold good in a general way as roughly indicating several great groups of species, there are species which unite these characters in such manner that to arrange them in either group does violence to some of their affinities.

Besides Kobelt, Kiener and Reeve have monographed these shells—the work of Kobelt being the most complete, and containing most of the species which I shall here describe and figure.

Genus **PERISTERNIA**, Mörch.

P. PICTA, Reeve. Pl. 64, fig. 39.

White, more or less completely covered with chestnut, or chestnut and orange narrow revolving lines; columella and interior of aperture blush color. Length, 1–1·25 inches.

Viti Isles.

P. BELCHERI, Reeve. Pl. 64, fig. 40.

White, with dark chocolate or blackish longitudinal flames or blotches, and revolving bands; epidermis light yellow; aperture white within.

Cargados Garajos, Indian Ocean; on coral. *Liukiu Is.*

Very closely allied to the preceding species.

P. AUSTRALIENSIS, Reeve. Pl. 64, fig. 41.

White, ornamented between the ribs by dark chocolate square blotches; aperture yellowish, with two interrupted bold brown bands. Length, 1·25 inches.

Port Essington, Australia.

P. PHILBERTI, Recluz. Pl. 64, fig. 42.

Chocolate-brown, variegated and banded with white; aperture white or purplish within. Length, 1·25 inches.

Philippines.

P. LOBBECKEI, Kobelt. Pl. 64, fig. 43.

White, base dark chocolate, with three more or less interrupted brown bands; aperture rosaceous, columella stained with black. Length, 1 inch.

Polynesia.

I suspect that this is merely a rather slim specimen of *P. Philberti*, which is itself, possibly a mere variety of *P. nassatula*, Lam.

P. NASSATULA, Lam. Pl. 64, figs. 44–47, 51, 52, 58.

Light yellowish-brown, deeper in the interstices of the ribs; aperture light purple. Length, 1–1·75 inches.

Red Sea; Indian Ocean; Philippines; New Guinea; New Caledonia; Paumotus.

P. sub-nassatula, Souverb. (fig. 52), is founded on a single specimen in which the ribs are undeveloped; it is from New Caledonia. *P. Deshayesii*, Kobelt (fig. 47), is a small form, without sufficient permanence to constitute a variety. *P. Forskalii*, Tapparone (fig. 51), is a long, slim form from the Red Sea, which may be separated as a variety. *P. microstoma*, Kobelt (fig. 58), from Mauritius, is the same.

P. WAGNERI, Anton. Pl. 64, figs. 59–62.

White or yellowish, interruptedly marked with chestnut spots between the ribs, forming three revolving rows of maculations; aperture white within. Length, 1–1·5 inches.

Viti Islands.—Garrett.

This unfortunate shell, misunderstood by Reeve and others, is certainly quite distinct from the species with which it has been confounded. I figure *Turbinella craticulata*, Wagner (not Lam.), upon which Anton founded the name (fig. 62); also *T. crenulata*, Reeve, not Kiener (fig. 61), *Purpura Bucciniformis*, Kiener (fig. 59), and *T. tigrina*, Hombr. et Jacq. (fig. 60), the latter being a young shell.

P. SPINOSA, Martyn. Pl. 64, figs. 48–50.

Body-whorl biangulate, and spinose on the angles; white, banded, especially on the lower part, with chestnut or chocolate; aperture light purple. Length, 1–1·5 inches.

Viti and Friendly Islands.

P. iostoma, Nuttall (but never described by him), is figured in Küster's monograph, and referred to the coast of California. The figure (fig. 50) represents very fairly a *P. spinosa*, and the locality is, of course, erroneous.

P. SPINOSA, Gray.

Shell fusiform, white, covered with a smooth brown periostracum; whorls seven, upper ones with a series of conical tubercles, the last with distinct spiral ridges and a sub-posterior series of conical spines; canal sub-cylindrical, with the mouth about as long as the spire; throat ridged; pillar with three very slight plaits.

Sierra Leone.

This species, the type of which is said to be in the British Museum, was described over forty years ago, but not figured. It has not been recognized by subsequent authors. It appears to correspond in some degree with *P. spinosa*, Mart. The name being pre-occupied, I would give it another if I knew the species to be a good one.

P. PULCHELLA, Reeve. Pl. 64, figs. 53–57.

Fulvous brown, sometimes white, with brown bands; aperture violet. Length, 1–1·10 inches.

Zanzibar; New Caledonia.

Var. MARIEI, Crosse (fig. 57). Brown or white, with brown bands and base; whorls with a more defined shoulder than in the type.

New Caledonia.

I think that *P. Sutoris*, Kobelt (fig. 56), described from a single specimen, locality unknown, is identical.

P. INCARNATA, Desh. Pl. 65, figs. 63–66, 69, 70.

Orange-brown, aperture rosy. Length, ·75–1·30 inches.

Philippines; Indian Ocean; Red Sea.

Ricinula pulchra, Reeve (fig. 64), appears to be the same species; it has the teeth on the outer lip characteristic of *Sistrum*, but there are two folds on the columella.

Var. ELEGANS, Dunker. Fig. 65.

Yellowish brown, with dark brown between the revolving ribs; whitish within. Length, ·66 to 1 inch.

Viti Isles.

P. gemmata, Rousseau, non Reeve (fig. 66), is probably the same form.

P. lauta, Reeve (fig. 69), I am inclined to place here also; it appears to be somewhat worn. I add a figure from Küster (fig. 70), which is somewhat like the next species.

P. Carolinæ, Kiener. Pl. 65, figs. 67, 68, 83.

Flesh-color or reddish with two dark chocolate bands; roseate within the aperture. Length, ·66 to 1 inch.

Mauritius, Philippines.

Very close in sculpture and form to the preceding species; distinguished by its coloration. *Ricinula bella*, Reeve (fig. 83), is a synonym.

P. clathrata, Valenc. Pl. 65, fig. 92.

White, tinged with pink, aperture white.

Length, 1–1·25 inches.

Habitat unknown.

At first I was inclined to place this among the numerous forms of *P. incarnata*, Desh., but the discovery of three specimens in the Collection of the Philada. Academy, all corresponding closely with the figure of the type in Kiener, induces me to consider it provisionally distinct. It is rather larger and thinner than *P. incarnata*, the ribs are narrower and more numerous, the canal more produced, the outer lip is not thickened nor dentate on the margin, the color is entirely different.

P. lirata, Pease. Pl. 65, fig. 71.

Orange-yellow on the longitudinal ribs, chocolate in the interstices, the revolving ridges occasionally spotted with white; aperture and columella saffron-yellow; covered with a thin, membranous epidermis, roughened longitudinally.

Length, 30 mill.

Marquesas Isles.

P. gemmata, Reeve. Pl. 65, figs. 72, 74.

Light yellow, longitudinal ribs narrower and more numerous than in *P. lirata;* chocolate, occasionally spotted with white; revolving sculpture impressed, instead of being ridged, as in *P. lirata.* Length, 30 mill.

Taheiti; Western Polynesia.

P. lirata was figured by Reeve as a variety of *gemmata;* Pease subsequently distinguished it. Though at first sight very similar

in general appearance, my specimens show very constantly the differential characters of the diagnosis.

P. GRANATA, Koch. Pl. 65, fig. 73.

Whitish, covered by brown tubercles formed at the intersection of the longitudinal and revolving sculpture; lip five-dentate within; columella with two obscure folds below.

Length, 4 inches.

Habitat unknown.

Evidently a young shell. It was described as a *Fusus*, but is either a *Peristernia*, in which case it may be a worn specimen of a young *P. gemmata*, Reeve, or else it is a *Ricinula*, and then, perhaps, = young of *R. concatenata*, Bl.

P. CHLOROSTOMA, Sowb. Pl. 65, figs. 75–82, 84, 91.

Shell whitish or yellowish, with an interrupted chestnut or chocolate central band, and the sutures and base of shell tinged with the same colors. Length, ·75–·85 inch.

Sandwich Islands; New Zealand; Philippines; Andaman Isles.

The earliest description, by Sowerby, gives no figure nor locality, but is sufficiently distinctive for certain identification. *P. chlorostoma*, Nuttall, and *P. xanthostoma*, Nuttall, are both unpublished names, but widely circulated. *P. crocea*, Gray, was likewise published without a figure, but fourteen years later. To these are to be added the subsequent names of *P. Newcombi* and *P. stigmataria*, A. Ad., *P. scabrosa*, Reeve, *P. solida*, Reeve. *P. scabrosa*, Reeve (fig. 78), said to come from Tonga Taboo (by Dunker), does not offer any distinctive characters except the absence of the spots, and these are present in a form (fig. 79) figured by Dunker as var. *gracilior*. The brown coloring is entirely absent in some Sandwich Island specimens before me.

P. *crenulata*, Kiener,* (fig. 80), is evidently the same species. Reeve has misconceived it, and figured for it an entirely different shell (*P. Wagneri*, Anton), as pointed out by Mr. Tapparone-Canefri, who reports the species from the Aru Islands. *P. Wagneri*, Anton, var. *Samoensis*, as figured by Küster (fig. 82), is also identical, whilst the *P. craticulata*, Wagner (not Gmelin), for which Anton proposed his name *Wagneri*, is another species.

* *Craticulata* by error on his plate.

I add also to the synonymy *P. decorata*, A. Ad. (fig 91), which, according to Mr. E. A. Smith's careful description can be no other than this species: the necklace-like rows of tubercles beneath the sutures are developed in several specimens of *chlorostoma* before me.

P. USTULATA, Reeve. Pl. 65, figs. 85–90.

Reddish brown, sometimes darker beneath the periphery and at the sutures, dark chocolate at base of shell.

Length, 1–1·4 inches.

New Caledonia, Viti Isles, Tonga Taboo, Mauritius, Indian Ocean.

The sculpture is not unlike the preceding species, but the color differs, and the shell is not only larger, but narrower, with longer spire and canal. The dark base is a character in common with *P. chlorostoma;* otherwise, the species varies greatly, particularly in sculpture, and has thus received several names. These synonyms are *P. Caledonica*, Petit (fig. 87), *P. iricolor*, Hombr. et Jacq. (fig. 88), *P. infracincta*, Kobelt (fig. 89), which is a light colored variety with a dark, interrupted, sub-sutural band, and *P. Marquesana*, A. Adams (fig. 90).

P. MACULATA, Reeve. Pl. 66, figs. 93, 94.

Yellowish white, irregularly stained and variegated with red blotches; the nodules upon the ribs whitish. Length, 1 inch.

Mauritius.—Robillard.

Is perhaps only a variety of the preceding species. *P. maculata*, Hombr. et Jacq., described from a single specimen, is evidently the same species.

P. NANA, Reeve. Pl. 66, fig. 95.

Yellowish brown; columella pink. Length, 1 inch.

Java.—Dunker.

Resembles *P. maculata*, Rve., so closely that I suspect it to be a light colored form of it.

P. BICOLOR, Kobelt. Pl. 66, fig. 96.

Whitish, purple-brown between the ribs, on the last whorl two rows of purple spots in the interstices; mouth and apex yellowish.

Length, 1·6 inch.

Locality unknown.

Not unlike *P. ustulata*, Rve., and may be only a large variety of it.

P. DESPECTA, A. Ad. Pl. 66, figs. 97, 98.

Yellowish or reddish brown, ornamented with white spiral liræ, base of canal dark chocolate. Length, ·8–1 inch.

China; New Zealand.

P. Zealandica, A. Ad. (fig. 98), is somewhat more slim, the spire more produced than the type, but is otherwise indistinguishable.

P. SQUAMOSA, Pease. Pl. 66, fig. 99.

Orange-yellow, nearly white at the base of the shell and beneath the sutures—where the ribs become spinose; light roseate within the aperture. Length, 1·25 inches.

Baker's Island.

P. ROLLANDI, Bernardi. Pl. 66, fig. 100.

Light orange-colored, yellowish within. Length, 41 mill.

New Caledonia.

Kobelt compares this to *P. Caledonica*, Petit (= *ustulata*, Rve.), and suggests that it may prove to be a large, old specimen of that species; it is very probable, although the figure and description do not indicate the dark base characteristic of *P. ustulata*. The figure reminds one of a *Coralliophila*.

P. NASSOIDES, Reeve. Pl. 66, fig. 101.

Yellowish brown, with a central white band; apex and aperture rosy. Length, 1·5 inches.

Isl. of Ticao, Philippines; upon coral reefs.—Cuming.

The plications of the columella are obsolete, so that it is very doubtful whether this is a true *Peristernia*. Reeve and Kobelt are both uncertain as to its generic position. I have seen no specimen, and therefore leave the shell where my predecessors, in the exercise of their best judgment, have placed it. Is it perchance a *Hindsia*?

P. SCABRA, Souv. Pl. 66, fig. 102.

Chocolate-brown, lighter on the ribs. Length, 15 mill.

New Caledonia.

Only a single specimen known, which is in the Bordeaux Museum.

P. Nouméensis, Crosse. Pl. 66, fig. 103.

Ashy, with three orange-colored bands; purplish within. Length, 11·5 mill.

New Caledonia.

This shell is so close to the preceding, that I have very little doubt that they will prove to be identical.

P. fuscozonata, Angas Pl. 66, fig. 104.

White, with a more or less interrupted, broad, brown band on the periphery—appearing above the sutures on the spiral whorls. Length, 14 mill.

So. Australia.

Described as a *Siphonalia* because there are no distinct plaits on the columella, but I think that Kobelt is correct in referring it to the Peristerniinæ. It looks something like a young *Triton chlorostoma*, Lam.

P. gibba, Pease. Pl. 68, fig. 143.

Ribs white, interstices pale purple-violet, sometimes iridescent; aperture deep violet. Length, 13 mill.

Howland Isl.

An aberrant form, quite distinct.

P. granulosa, Pease. Pl, 66, fig. 105.

Shell elongately fusiform, longitudinally ribbed, ribs nine, rounded, corded with transverse ridges, with a small granose ridge encircling the interstices; whorls angulated and slightly excavated at the upper part, angulation encircled by close-set granulose ridges; outer lip lirate within; whorls convexly rounded; color reddish-brown, granules lighter, aperture violet. Length, 22 mill.

Paumotus Is.

Undetermined Species.

P. Californica, A. Ad. In H. & A. Adams' Genera. I have not found the description of this species.

P. fenestrata, Gould. A young shell 13 mill. in length. Not figured.

St. Simon's Bay, Cape of Good Hope.

There is a *Turbinella fenestrata*, Anton—also undetermined.

P. NODULOSA, A. Ad. Not figured. *Australia.*

P. LUCULENTA, H. & A. Ad. White, with a broad flesh-colored band in the middle of the nodosely plicate whorls, and with a series of rufous-dotted spiral liræ at the fore-part of the last whorl. Dimensions not given; not figured. *Gulf of Mexico.*

P. VIBEX, Brod. Turrited, seven-varicose, varices subnodose, transversely sulcate; subluteus, aperture white, sulcate within; margin of labrum crenulate; canal very short; epidermis fuscous, rugose. Length, 1·63 inches, lat., 1 inch.

St. Elena and Panama; sandy mud, six to twelve fathoms.

"This shell appears to be intermediate between *Murex* and *Turbinella*. It has the varices of the former, and the plaits on the columella which distinguish the latter."

Described as a *Murex*, and referred by Sowerby to *Pollia* (= *Cantharus*). Not figured.

Genus **LATIRUS**, Montfort.

As already stated in my synopsis of the genera, the diagnosis of this genus is very unsatisfactory, its distinction from *Peristernia* being entirely arbitrary. One of its characters is that the shell is umbilicated, yet perhaps half of its species are utterly without perforation, whilst those which possess it, show only a narrow opening, except when abnormal in growth—like *L. Maderensis*. Swainson's group *Plicatella* has been adopted by Messrs. Adams as a subgenus of *Latirus*, having "spire moderate, whorls angular, concavely depressed around the upper part," but these are only comparative characters, and I prefer to suppress the group rather than place in it species having no relation thereto, as Messrs. Adams have done. The umbilicus shows more distinctly in most of the species of *Latirus* than in those of *Peristernia*, but in some of them it is not any better marked; *Latirus*, however, differs in form from *Peristernia*, the species having longer spire and canal, the columella generally straight, the plications more central, simply because the canal is more produced.

The animals of most of the species that have been observed, are of a dull red color.

L. POLYGONUS, Gmel. Pl. 66, figs. 106–108; pl. 67, figs. 109–114.

Orange-brown or whitish, with revolving bands and strigations of chestnut-brown; fulvous white within the aperture.

Length, 2–2·5 inches.

Isle of Ticao, Philippines:—on the reefs. Cuming.
Mascarene Isles; Red Sea; Central Pacific.

Var. TESSELLATA, Kobelt. Fig. 109.

Var. BARCLAYI, Reeve. Fig. 110. *Mauritius.*

Var. CANDELABRUM. Reeve. Fig. 114.

Revolving ridges much sharper; umbilicus usually more open.

Isle of St. Elena, W. Columbia. In sandy mud, seven fathoms.—Cuming.

L. AMPLUSTRIS. Mart. Pl. 67, figs. 115, 116.

White under a yellowish epidermis, closely and regularly banded with chestnut brown; aperture ivory white.

Length, 2–3 inches.

Isle of Annaa; on the reefs.—Cuming. *Ascension Isl.*—Pease.

Of the same general appearance as the preceding species, but much smoother, the ribs and revolving sculpture obsolete.

L. GIBBULUS, Gmel. Pl. 67, fig. 117; pl. 68, fig. 126.

Orange or brown, encircled by chestnut-brown bands; yellowish pink within the aperture; usually smooth and polished.

Length, 2·5–3·5 inches.

Australia.

The columella is very indistinctly, sometimes not at all plaited.

L. CARINIFERUS, Lam. Pl. 67, fig. 118, 119.

Yellowish brown, lighter on the ribs; aperture white within.

Length, 2–2·5 inches.

Indian Ocean; Viti Is.—Garrett.

L. CERATUS, Gray. Pl. 67, fig. 120.

Yellowish brown, lighter on the ribs; epidermis chestnut or chocolate. Length, 2 to 3 inches.

Galapagos Is., under stones at low water—Cuming;
Panama; Mazatlan.

L. RECURVIROSTRIS, Schubert and Wagner. Pl. 67, fig. 121.

Pale orange-brown, interstices of the ribs stained and spotted with chestnut-brown; aperture orange-yellow.

Length, 2·5 to 3·5 inches.

Isl. of Luzon, Philippines; in deep water.—Cuming.

Deshayes considered this a variety of *L. cariniferus*, which it may well be; it is, however, proportionally narrower, the intertubercular raised belt on the body whorl is not so wide, and the umbilicus is much wider.

L. AMALIÆ, Kobelt. Pl. 68, fig. 131.

Dark brownish yellow, lighter on the revolving ridges, and chestnut-brown in their interstices upon the ribs; yellowish brown within. Length, 2 inches.

Hab. unknown.

Very like *L. recurvirostris* in form, but is smaller, and has not the wide open umbilicus of that species.

L MADERENSIS, Watson. Pl. 68, figs. 124, 125.

Yellowish to chestnut-brown, darker in the interstices of the ribs; white or light yellowish within the aperture.

Length, 1·5 to 2·5 inches.

Madeira; West Indies.

This species is certainly very closely allied to the preceding; having much the same form and the large, open umbilicus. Watson gave it a new generic name—*Chascax*, and states that the inner lip is quite smooth; this, however, may be due to the bad condition of his very insufficient material, the specimen figured by him showing dentations within the border of the lip, which he states to be caused by the borings of annelids. West Indian specimens before me, in much better condition are lighter in color, larger, and have three not prominent columellar plaits, *Turbinella Stokesii*, Gray, from Porto Praya, Cape Verd Isles, a species which has never been figured or identified, corresponds in description somewhat with this species.

L. INFUNDIBULUM, Gmel. Pl. 67, fig. 122; Pl. 68, figs. 127, 144.

Orange-yellow or light brown, with darker narrow revolving ridges; epidermis dark brown. Length, 2 to 3 inches.

West Indies; in deep water.

L. attenuatus, Reeve (figs. 122, 144), appears to be founded on a young shell of the above.

L. FILOSUS, Schubert and Wagner. Pl. 68, fig. 128.

Whitish, the narrow revolving ridges chestnut-brown. Length, 1·5 to 2·25 inches.

Prince's Isl.; Senegal.

L. LYRATUS, Reeve. Pl. 67, fig. 123; Pl. 68, fig. 145.

Rufous-brown, lighter on the ribs. Length, 1·75 inches.

Philippine Isles.

Kobelt (in Küster, Conch. Cab.) considers this = *Fusus constrictus* Koch, which was published during the same year. The latter I have referred to *Coralliophila*, because the figure and description afford no evidence of columellar plaits, and the umbilical fasciole is fringed as in that genus.

L. MODESTUS, Anton. Pl. 68, figs. 129, 130, 142.

Reddish yellow, revolving cords sometimes darker; sutures frilled. Length, 1·85 inches.

Panama to Acapulco.

Described as a *Fusus*, without locality, and said to have no plaits on the columella; it has the facies of a *Latirus*, however, and appears to be nearly allied to the preceding species.

L. spadiceus, Reeve (fig. 130) can scarcely be distinguished as a different species. The latter is said by C. B. Adams to occur at Panama. I include also *L. concentricus*, Reeve (fig. 142), which occurs at St. Elena and Acapulco.

L. LANCEOLATUS, Reeve. Pl. 68, fig. 132.

Light yellowish brown, darker beneath the periphery; violet within the aperture. Length, 1·75 inches.

Philippine Is. on the sands.—Cuming.

L. LANCEA, Gmel. Pl. 68, figs. 133–135.

Yellowish brown, the interstices of the longitudinal ribs chestnut brown. Length, 2 inches.

Isle of Ticao, Philippines; Indian Ocean.

Fusus acus, Ad. and Reeve (see p. 63, t. 38, f. 160) is almost certainly a synonym.

L. PAETELIANUS, Kobelt. Pl. 68, fig. 136.

Light yellowish brown, paler on the ribs; aperture white. Length, 46 mill.

? China.

L. THERSITES, Reeve. Pl. 68, fig. 137.

Ivory white, covered with a thin, yellowish epidermis. Length, 50 mill.

China.

L. CASTANEUS, Reeve. Pl. 68, fig. 138.

Reddish orange, covered by a shining, chestnut-colored epidermis; aperture white. Length, 2 to 2·5 inches.

Panama.

Gray has also described a *Turbinella castanea*, in the Zool. Beechey's Voy., but has not figured it, and gives the locality "Pacific Ocean." The indefinite description may suit this species as well as any other.

L. ACUMINATUS, Kiener. Pl. 68, figs. 139, 140.

White, under a rather persistent dark brown epidermis. Length, 1·75 inches.

Philippines.—Cuming.

L. GRACILIS, Reeve. Pl. 68, fig. 141.

Reddish brown; yellowish white in the aperture. Length, 2 inches.

Locality unknown; possibly *W. coast of Central America.*

Carpenter described *L. tumens* distinguishing it from *gracilis* "In *L. gracilis* the spiral lines are few and raised; in this species numerous and impressed. Length, 2·78 inches. *Hab. Panama.*" A single specimen in the Cumingian collection: not figured. The distinctive character is insufficient, especially as in the figured specimen of *gracilis* the spiral lines are not "few."

L. FASTIGIUM, Reeve. Pl. 69, fig. 164.

Reddish brown, sometimes lighter on the ribs. Length, 1 to 1·25 inches.

Indian Ocean—E. A. Smith; *St. Thomas, W. I.*—R. Swift.

L. AUREOCINCTUS, Sowb. Pl. 69, fig. 146.

Dark chocolate, encircled by golden yellow bands which are continuous over ribs and interstices. Length, 20 mill.

Mauritius—Robillard.

A very distinct species, both in form and coloration.

L. CAYOHUESONICUS, Sowb. Pl. 69, fig. 147.

Purplish brown, same color within the aperture; columella bicostate. Length, 16 mill.

Key West, Florida; St. Thomas, W. I.—R. Swift.

There are four immature specimens of this very recently described species in the Swift Collection. In one of them there is a broad lighter band below the periphery.

L. NODATUS, Martyn. Pl. 69, fig. 148.

Orange-brown (light yellow under the epidermis); the aperture roseate. Length, 2·5–3·5 inches.

Sandwich and Viti Islands, etc.; Panama.—Cuming?

The last locality is doubtless erroneous, as it has not been confirmed by any collector subsequent to Cuming

L. VARICOSUS, Reeve. Pl. 69, fig. 149.

Light orange-brown, the ribs dark chocolate-brown; aperture yellowish or blush. Length, 2·5 inches.

Galapagos Is.; in crevices of rocks.—Cuming.

L. RHODOSTOMA, Dunker. Pl. 69, fig. 150.

Brown, with the revolving liræ whitish; aperture rosaceous. Length, 22 mill.

Japan.

L. BREVICAUDATUS, Reeve. Pl. 69, figs. 154, 151.

Reddish brown, the revolving cords dark chestnut-brown; aperture yellowish brown. Length, 1·5–2 inches.

West Indies.

Most of the specimens before me have a well-marked posterior channel in the aperture. *L. filamentosus*, Koch (fig. 151), is a synonym, perhaps, but the only figure is evidently a very poor one, and hardly to be identified with certainty.

L. CONTEMPTUS, A. Ad. Pl. 69, fig. 152.

Reddish brown, with darker revolving lines; yellowish within the aperture. Length, 1·25 inches.

St. Croix, West Indies.

I have not seen this species; there is nothing like it in the Swift Collection.

L. FALLAX, Küster. Plate 69, fig. 153.

Reddish brown, darker in the interstices of the ribs; aperture reddish white. Length, 45 mill.

Habitat unknown.

Kobelt quotes three specimens in the German collections; I have not seen it.

L. BRAZIERI, Angas. Pl. 69, fig. 155.

Orange-brown, lighter on the ribs; columellar plaits very slight or absent. Length, 1 inch.

New South Wales.—Brazier.

Adult specimens have a slight callous projection on the columella, near the posterior junction of the lip.

L. VIOLACEUS, Reeve. Pl. 69, fig. 156.

Violet-white, stained with dark chestnut at base; aperture pinkish violet. Length, 1·5 inches.

Habitat unknown.

I have not seen this species.

L. SANGUIFLUUS, Reeve. Pl. 69, figs. 157, 158.

Orange or reddish, the ribs and revolving ridges yellowish white. Length, 2 inches.

Habitat unknown.

This may be a short variety of the following species.

L. CRATICULATUS, Linn. Pl. 69, fig. 159.

Whitish, with the ribs orange-red, or the deep color in the interstices and the ribs white.

Red Sea, Indian Ocean, Philippines, Central Polynesia, Isle of Bourbon.

L. TURRITUS, Gmel. Pl. 69, figs. 160, 161.

Reddish orange, the revolving ridges chestnut or chocolate; aperture yellowish. Length, 1·75–2·25 inches.

Red Sea, Philippines, Australia, Isle of Bourbon, Central Polynesia.

L. PRISMATICUS, Martyn. Pl. 69, figs. 162, 163.

Yellowish white, the revolving ridges as they pass over the ribs blackish blue, chatoyant when wet; saffron-yellow within the aperture. Length, 1·5–3 inches.

Central Polynesia.

Undetermined Species.

L. Zea, Mörch, Yoldi Catalogue. Not described.
L. neglectus, A. Ad. *China.*
L. armatus, A. Ad. *California.*
L. flavidus, A. Ad. *Philippines.*
L. elegans, A. Ad. *Hab.?*
L. distinctus, A. Ad. *Hab.?*
L. Strangei, A. Ad. *Sydney, Australia.*

None of the above are figured, nor are dimensions and distinctive characters given.

Genus **LEUCOZONIA**, Gray.

The most prominent character of this genus, when present, is the tooth which arises from the fore-part of the outer lip. It varies greatly in its development in the different species. In *L. cingulata*, in which it is always present, it is long, curved and tusk-like, so that the species has been erroneously arranged with *Monoceros*, from which it is instantly distinguished by its claw-like operculum and columellar plaits. In the other species it is sometimes entirely absent in some specimens, whilst well-developed in others. There is usually a posterior subchannel to the aperture. The sculpture does not vary essentially from that of the species of *Latirus*, but the color is usually a chestnut-brown, the only ornamentation being lighter or darker revolving bands. Usually the species are prominently shouldered; those which have whorls rounded above constitute the sub-genus *Lagena*—which may be conveniently retained for them.

L. cingulifera, Lam. Pl. 70, figs. 165–173.

Chestnut-brown, encircled below the periphery by a white callous raised band, terminating in a tooth on the outer lip; apperture white, bluish or yellowish within.

Length, 1–2·5 inches.

Mouth of the Gambia, W. Africa; West Indies; Florida; Brazil.

The specimens said to come from W. Africa are the largest, but I have never seen any which can be referred to that locality without doubt. The species is variable in its proportions and in the prominence of its sculpture and has therefore received several

names; the numerous specimens before me, representing localities from Florida, Central America, West Indies and Brazil, enable me to place these in the synonymy. Figs. 166–168 represent *L. angularis*, Reeve; Fig. 169 is *L. Knorrii*, Desh., from Honduras and Brazil; Fig. 170 is *L. Braziliana*, d'Orb., also from Brazil, and Fig. 171 represents the animal thereof; Fig. 173 is *L. rudis*, Reeve.

L. inculta, Gould, described without figure or locality is very probably a synonym. *L. nassa*, Gmel, is the oldest name for the species, but he included *L. leucozonalis* in his species, and as the subsequent name given by Lamarck has become universally current, it seems advisable to adopt it.

L. TRISERIALIS, Lam. Pl. 70, figs. 174–177.

Chestnut-brown, encircled with three rows of revolving, whitish nodules; aperture and columella white. Length 1–1·5 inches.

Isle St. Vincent; W. Africa.—Menke; *Bahia, Brazil.*

The latter locality is for *L. dubia*, Petit (fig. 174), which appears to me to be a somewhat depauperate variety of *triserialis*. Another variety is *Turbinella Hidalgoi*, Crosse (fig. 177), which develops three instead of the two lower rows of tubercles. Its habitat is unknown.

L. MULTANGULA, Phil. Pl. 70, fig. 187.

Yellowish-white, with brown strigations between the longitudinal ribs. Length, 1·12 inches.

Yucatan.

There is but little doubt that this species, described as a *Fusus*, really belongs to the *Peristerniinæ*, as the columella is said to be plicate at the base, and the form is not unlike specimens of *L. triserialis*. It may equal that species, possibly, with longitudinal ribs, developed at the expense of revolving ones. It is an immature individual.

L. OCELLATA, Gmelin. Pl. 70, figs. 178, 179.

Chestnut or chocolate, the raised portions white; aperture white. Length, 1–1·25 inches.

West Indies.

There is considerable variation in the form of this well-known species, the spire being sometimes drawn out like the elate forms of *L. cingulifera*, Lam.

L. CINGULATA, Lam. Pl. 70, fig. 180.

Chestnut, with distant, flat, somewhat raised, revolving bands of dark chocolate; aperture white. Length, 1·5–2 inches.

Panama to Mazatlan; southern extremity of Florida, W. W. Calkins.

Mr. Calkins is the only authority for the occurrence of this common West Coast species in the Atlantic waters; his locality, however, is not to be doubted:—besides, several other Pacific species have been discovered recently on the Florida coast.

Subgenus **Lagena**, Schum.

L. SUBROSTRATA, Gray. Pl. 70, figs. 181, 182.

Yellowish brown, white within the aperture.

Length, 1·6 inches.

Bay of Montija, W. Columbia (in sandy mud, 12 fathoms—Cuming).

L. agrestis, Anton (fig. 182), is founded on younger specimens of this species. Its generic position is very doubtful; Reeve considers it a *Pyrula* (= *Melongena*), and H. and A. Adams have put it in *Clavella;* it is also allied to *Cantharus distortus*. The columella plaits are sometimes obsolete.

L. LEUCOZONALIS, Lam. Pl. 70, figs. 183, 184.

Brown, with a white raised band below the periphery, terminating in a tooth on the lip; upper part of whorls subnodulous. Length, 1–1·5 inches.

West Indies; Honduras.

Different as this species appears at first sight in its form and want of distinct shoulder and tubercles, there is almost sufficient evidence to justify its being made a synonym of *L. cingulifera*.

L. SMARAGDULA, Linn. Pl. 70, figs. 185, 186.

Chestnut-brown, closely encircled by numerous, narrow, equidistant white lines; aperture white. Length, 1–2 inches.

Philippines; Viti Isles.

Undetermined Species of Peristerniinæ.

None of the following species have been figured, nor have they been identified by the monographers of the *Turbinellæ*.

TURBINELLA STRIATA, Gray. *No locality.*

T. (Fusus) sulcata, Gray. *No locality.*
T. (Fusus) elegans, Gray. *Sierra Leone.*

A. Adams and Dunker have both used the same specific name.

T. plicatula, T. lævigata, T. impressa, T. fenestrata, Anton. *All without locality.*

T. spinosa, Phil. *China.*

T. (Fasciolaria) bistriata, Gould and Carpenter.

The small size (1·07 inches) and long canal render it improbable that this is a *Fasciolaria*, unless a very young specimen. Possibly a *Latirus*. *Panama;* a single specimen.

T. (Fusus) rosa-ponti, Lesson. *Gambier Is.*
T. Taheitensis, Lesson. *Taheiti.*
T. Purpuroides, Lesson. *Gambier Is.*

Family BUCCINIDÆ.

Shell ovate, oblong or pear-shaped; canal moderate or short, columella without folds or plications.

Operculum with terminal or lateral nucleus.

Dentition 1 · 1 · 1. The rhachidian tooth normally three (sometimes as many as seven) pronged, the laterals two- or three-pronged.

The typical *Buccinum* is a rather thin ovate shell, uniform and dull in color, with the base of the aperture broadly notched instead of being prolonged (as in the Fusidæ) into a canal; but with these have been more recently associated pyriform shells having some resemblance to the latter family. *Hemifusus*, *Melongena*, *Sipho*, etc., pretty well bridge the chasm between the two families as far as the general form of the shell is concerned, but in those species of Buccinidæ approaching *Fusus* there is the general distinction that the canal, if long, is wide and open; whilst tortuous as in *Fasciolaria*, it has at most a single fold in lieu of the plaits on the columella of that genus. I have arranged the subfamilies and genera, commencing with those most closely allied to *Fusus*, and terminating with the buccinoid forms. Although the range of form is great, it will be seen that the transitions are not abrupt; and in this case the lingual dentition affords confirmation of the grouping adopted upon conchological grounds.

Sub-family *Melongeninæ*. Shell pear-shaped, heavy; spire and canal short.

Sub-family *Neptuniinæ*. Shell rather thin, pear-shaped or ovate; canal moderate and twisted.

Sub-family *Pisaniinæ*. Shell small, heavy, costate; canal very short and wide, outer lip thickened, dentate within; columella callous or rugose.

Sub-family *Buccininæ*. Shell rather thin, costate or smooth, ovate, covered with a horny epidermis; aperture very large, lip thin, smooth within, terminating below in a short oblique notch.

Sub-family *Eburninæ*. Shell thick, smooth, ovate-oblong; deeply umbilicated or umbilicus covered by a heavy callus; outer lip simple acute.

Sub-family *Photinæ*. Shell small, smooth, costate or cancellate, ovate or turreted, thick; outer lip striate within; canal short and wide, columella twisted below.

Synopsis of Genera.

Sub-Family MELONGENINÆ.

MELONGENA, Schum. Shell pyriform, solid, dark colored or banded; spire short, nodulose, spiny; aperture oval-oblong; canal short, open; columella smooth; outer lip simple. Operculum solid, claw-like, nucleus apical. Dentition, Pl. 25, figs. 10, 11; Pl. 26, figs. 12, 13.

HEMIFUSUS, Swainson. Shell sub-fusiform, uncolored or light yellowish; spire shorter than the aperture, ponderous; whorls armed with compressed spines upon the shoulder; aperture long ovate, with an ascending internal canal at the hind part, produced into a moderate wide canal anteriorly; columella smooth; outer lip simple. Operculum unknown. Dentition, Pl. 26, fig. 19.

[*Thatcheria*, Angas. Shell conic with scalariform spire, whorls attenuating to base; growth flexuous, causing a broad sinus on the flattened shoulder of the body-whorl. No doubt a monstrosity.]

Sub-Family NEPTUNIINÆ.

NEPTUNEA, Bolten. Shell fusiform, ventricose; spire elevated, whorls rounded, covered with a horny epidermis, apex papillary; aperture oval; canal short; inner lip simple, smooth. Operculum ovate, nucleus apical. Dentition, Pl. 26, figs. 14–16.

VOLUTOPSIS, Mörch. Shell smooth, ovate, ventricose; spire short, apex bulbaceous; last whorl rather large; aperture very large, the lip considerably expanded; canal scarcely produced, widely obliquely truncate. Operculum irregularly ovate, with apical nucleus. Dentition, Pl. 26, figs. 24, 25.

Subgenus HELIOTROPIS, Dall. Shell thin, sinistral, apex mammillated; operculum relatively very small.

SIPHO, Klein. Shell thin, pyriform or fusiform, not tuberculate or spiny, usually smooth and rounded whorls; spire moderate; canal produced and recurved. Operculum ovate, nucleus apical. Dentition, Pl. 26, figs. 17, 18.

Subgenus MOHNIA, Friele. Operculum paucispiral.

SIPHONALIA, A. Adams. Shell ovately-fusiform, sometimes variegated in coloring, rather thin, epidermis very thin, fugaceous; last whorl ventricose, shouldered, usually nodosely plicate and spirally ribbed; aperture oval, outer lip thin, columella smooth; canal rather short, twisted. Operculum ovate, nucleus apical. Dentition unknown.

Subgenus AUSTROFUSUS, Kobelt. Whorls not shouldered.

FULGUR, Montf. Pear-shaped, thin; spire short, the angle of the shoulder spinous; body-whorl very large, attenuated below into a rather long twisted canal; lip and columella smooth, the latter with a single, rather obsolete fold. Operculum ovate, nucleus apical. Dentition of typical form; rhachidian tooth 5–6 dentate, laterals 5–6 dentate.

Subgenus TAPHON, H. and A. Adams. Shell dextral, transversely striated, whorls rounded; aperture ovate, fore-part produced into a long, slightly-recurved canal.

Subgenus SYCOTYPUS, Browne (Gill). Shell with canaliculate suture, periostraca ciliated, nodulous instead of spinous. Dentition, Pl. 26, fig. 20.

STREPTOSIPHON, Gill. Shell subfusiform; spire rather short, apex papillary; whorls angulated at the upper part and tuberculate on the angle; columella concave, with a double very oblique fold on the lower part; canal moderately long, twisted; aperture lirate within. Operculum and animal unknown. Seems to connect *Busycon* with *Tudicla*.

TUDICLA, Bolt. Shell fusiform; spire short, apex papillary; aperture oval; canal very long, narrow, straight; columella smooth, flattened, with a single large, or three smaller transverse folds at the fore-part. Operculum fusoid. Dentition unknown.

Sub-Family PISANIINÆ.

PISANIA, Bivona. Shell oblong; spire prominent, whorls smooth or spirally striated; canal very short; outer lip thickened and crenated. Operculum ovate, nucleus apical.

EUTHRIA, Gray. Shell fusiform, smooth; aperture oval, produced anteriorly into a long recurved canal; inner lip simple; outer lip posteriorly sinuated, striate within. Operculum ovate, nucleus apical. Dentition, Pl. 27, figs. 27, 28.

METULA, H. and A. Adams. Shell elongately fusiform, finely cancellated; spire elevated, acute; aperture narrow; inner lip distinct, smooth; outer lip thickened externally, crenulated within, emarginate posteriorly. Operculum unknown. Dentition, Pl. 26, fig. 21.

CANTHARUS, Bolten. Shell bucciniform, more or less ventricose in the middle, narrowed anteriorly; spire and aperture nearly equal; columella generally with a few transverse ridges; outer lip internally crenated, and with a superior siphonal canal. Operculum ovate, nucleus apical. Dentition, Pl. 26, figs. 22, 23; Pl. 27, fig. 26.

Sub-Family BUCCININÆ.

BUCCINUM, Linn. Shell ovate or oblong, covered with a horny epidermis; spire elevated, apex acute; aperture large, oval, emarginate in front; canal wide, very short, or a mere oblique truncation of the base of the aperture; columella smooth; inner lip expanded; outer lip usually thin, smooth internally. Operculum ovate, nucleus small near the outer front edge. Dentition, Pl. 27, figs. 29, 30.

NEOBUCCINUM, E. A. Smith. Shell bucciniform, smooth, thin; aperture obliquely, widely notched below. Operculum subspiral. Dentition resembling that of *Neptunea*.*

BUCCINOPSIS. Jeffreys. Shell bucciniform, smooth or spirally striulate, last whorl inflated; aperture obliquely truncate below. Operculum small, subtriangular, nucleus apical. Dentition, Pl. 27, fig. 32.

VOLUTHARPA, Fischer. Shell ventricose, thin; spire short, body-whorl and aperture very large. Operculum usually wanting; when present, at first with apical nucleus, afterwards becoming annular. Dentition, Pl. 27, fig. 31.

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* Mr. Smith founds his genus principally upon the paucispiral operculum, but the figure given by him shows an operculum which is no more curved than occurs sometimes in the genus *Sipho*, for example. This, with the dentition indicates relationship with *Neptunea*, but the absence of canal in the shell on the other hand, relates it to *Buccinum*.

CHLANIDOTA, Martens. Shell subglobose, thin, spirally costate. Operculum with apical nucleus. Dentition: middle plate with five teeth, the outer ones much smaller, laterals with three teeth, the middle one smallest, the outer one somewhat smaller than the inner.

COMINELLA, Gray. Shell bucciniform, marked or spotted, covered with an epidermis; spire short, acute, last whorl large, ventricose, with a posterior depressed groove at the suture, producing a contraction at the hind part of the outer lip.* Operculum with apical nucleus. Dentition, Pl. 27, fig. 32.

CLEA, A. Adams. Shell turbinate, covered by an epidermis, aperture ovately acute, truncate at base and profoundly sinuate, dextral margin regularly arcuate, parietal callus none or thin. Operculum subtrigonal, with apical nucleus. Dentition, Pl. 27, fig. 38. Inhabits fresh wate

Subgenus CANIDEA, H. Adams. Shell small, fusiform or turbinate, covered with an epidermis; spire longer than the aperture, apex eroded; whorls slightly convex, plicate; aperture elongately ovate, emarginated in front; columella truncate; lip simple, sinuated in front. Operculum small, unguiculate; nucleus apical. Dentition, Pl. 27, fig. 37. Living in fresh water.

Sub-Family EBURNINÆ.

EBURNA, Lam. Shell ovate-oblong, thick, porcellanous, under a thin epidermis; deeply umbilicated; spire acuminated, whorls more or less convex, suture more or less channeled; aperture oval; columella arcuated, posteriorly callous; inner lip spreading, often covering the umbilicus in the adult; outer lip simple, acute. Operculum with apical nucleus. Dentition, Pl. 27, fig. 33.

Subgenus ZEMIRA, H. and A. Adams. Umbilicus moderate; outer lip with a tooth near the fore-part.

MACRON, H. and A. Adams. Shell ovate, solid, with a thick epidermis; spire elevated; columella wrinkled, with a callosity at the upper part; outer lip thin, with a small tooth anteriorly. Operculum ovate, with apical nucleus. Dentition unknown.

Sub-Family PHOTINÆ.

PHOS, Montfort. Shell cancellated, oblong, acuminated, usually longitudinally ribbed; outer lip striated internally, with a slight sinus near the fore-part; columella obliquely grooved, or with a single plait in front. Operculum claw-shaped, nucleus apical. Dentition, Pl. 27, fig. 35.

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* H. and A. Adams (Genera II, 615) make *Adamsia*, Dunker, a sub-genus of *Cominella;* the operculum and facies of the type show it, however, to be a *Purpura* (See Manual, Vol. II, p. 156).

NASSARIA (Link), H. and A. Adams. Shell ovately fusiform; spire accuminated, whorls longitudinally ribbed and cancellated; aperture ending anteriorly in a long recurved canal; inner lip thin, circumscribed, transversely corrugately plicated; outer lip grooved internally. Operculum ovate, nucleus apical. Dentition, Pl. 27, fig. 34.

CYLLENE, Gray. Shell ovate; spire short, acute, suture canaliculated; columella concave, smooth or finely grooved; outer lip with a slight sinus at the fore-part, emarginate posteriorly, grooved internally. Operculum with terminal nucleus. Dentition unknown.

Fossil Genera and Subgenera.

Sub-Family MELONGENINÆ.

Genus BULBIFUSUS, Conrad. Not characterized.

B. INAURATUS, Conr.* (=FUSUS FITTONII, Lea), Pl. 29, fig. 55. Eocene, *Claiborne, Ala.*

Genus CORNULINA, Conr. Not charactized.

C. ARMIGERA, Conr. (= FUSUS TAITII, Lea). Pl. 29, fig. 56. Eocene, *Ala.*

Genus LEIOSTOMA, Swains. Fusiform, ventricose in the middle, entirely smooth, almost polished; inner lip thickened and vitreous; base of the pillar very straight.

L. BULBIFORMIS, Lam. Pl. 29, fig. 57. *Grignon.*

A comparison of numerous specimens indicates the very close relationship of *Bulbifusus*, Conr., with this genus, which is itself entirely too close to the recent group *Volema*. Bayle has changed the name to *Sycum*, because *Leiostoma* is preoccupied by Lacépède in Fishes. I cannot concur in such changes, which would completely unsettle our nomenclature.

Sub-Family NEPTUNIINÆ.

Genus FUSISPIRA, Hall. Shell fusiform, imperforate, spire more or less elevated, with rounded volutions; aperture elongate, oval or elliptical, produced below, forming a sub-rimate canal; columella slightly twisted, without folds, peristome sharp. Surface smooth.

F. VENTRICOSA, Hall. Pl. 29, fig. 58. Trenton Limestone, near *Green Bay.*

So far as known, this palæozoic genus is confined to the Quebec, Trenton and Hudson River groups.

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* In describing the fossil genera of Conrad I quote his specific names for the types specified by him. I have indicated, however, the equivalent species of Dr. Lea in brackets. The decision of questions of priority of publication of fossil species does not fall within the scope of this work.

Genus CLOSTERISCUS, Meek. Shell thin, fusiform; spire slender, longer than aperture and canal; surface smooth or minutely striate; aperture rhombic, outer lip broadly retreating above the middle, thin, excepting at irregular intervals, where it became thickened and denticulate within, so as to leave internal varices behind as the shell advanced in growth; inner lip very thin, or wanting; columella smooth?

C. TENUILINEATUS, Meek. Pl. 29, fig. 59, Cretaceous, *Cheyenne Riv., Dakota.*

Genus PALÆATRACTUS, Gabb. Pyriform, thick; spire low; columella slightly twisted; outer lip simple, inner lip incrusted. Surface heavily ribbed or cancellate.

P. CRASSUS, Gabb. Pl. 29, fig. 60. Cretaceous, *California.*

Genus PYRIFUSUS, Conrad. Pyriform; columella broad, thick, flattened; body volution transversely oval, compressed dorso-ventrally.

P. SUBDENSATUS, Conr. Pl. 29, fig. 61. Cretaceous, *Mississippi.*

Subgenus NEPTUNELLA, Meek. Body volution rounded; columella not flattened; spire more elevated; outer lip broadly sinuous above the middle.

P. NEWBERRYI, Meek and Hayden. Pl. 30, fig. 62. Cretaceous, *Dakota.*

Subgenus HERCORHYNCUS, Conrad. Shell fusiform; spire prominent, scalariform, longitudinally ribbed and tuberculated, or with tubercles only; top depressed above the angle or shoulder of the last whorl, which depression becomes angular at the aperture, emarginating the upper part of the labrum; last whorl broad and rather abruptly rounded at base; beak abruptly recurved and produced.

H. TIPPANA, Conr. Pl. 30, fig. 63. Cretaceous, *Mississippi.*

Genus LIROFUSUS, Conr. Genus not characterized.

L. THORACICUS, Conr. (= DECUSSATUS, Lea). Pl. 30, fig. 64. Eocene, *Alabama.*

Subgenus SYCOPSIS, Conrad (Subgenus of *Busycon* = *Fulgur*). Shell tuberculate, not canaliculate. Eocene and Miocene. Differs from the genus in having tubercles instead of spines on the shoulder.

Genus STREPSIDURA, Swainson. Widely fusiform; basal portion of the pillar turned outwardly, with a sharp fold at the base of the aperture; shell costate and sub-carinate, body-whorl ventricose.

S. COSTATA, Swainson (= *Fusus ficulneus*, Lam.). Pl. 30, fig. 65.

Genus PAPILLINA, Conrad. Pyriform; shoulder angular and spinous; beak long, with an obtuse fold on the columella; three volutions from the apex forming a papillated summit. Very probably = *Tudicla*, Bolt.

P. PAPILLATUS, Conrad. Pl. 30, fig. 66. Eocene, *Claiborne, Ala.*

Genus PERISSOLAX, Gabb. Spire depressed; body-whorl patulous; canal long; columella without folds or plaits.

Distinguished from *Papillina* by the want of a columellar fold, and evidently intended to be ranged in the Fusinæ, but I think its general appearance decidedly that of *Busycon* or *Tudicla*. Cretaceous—Eocene.

P. BREVIROSTRIS, Gabb. Pl. 30, fig. 67. Cretaceous, *California*.

Levifusus, Conrad, is generally considered synonymous with *Perissolax*. It is an uncharacterized Eocene form, of which I figure an example:

L. (PERISSOLAX) TRABEATUS, Conr. Pl. 30, fig. 69. Eocene, *Alabama*.

Genus TORTIFUSUS, Conrad. Differs from *Busycon* in being without a trace of tubercles or spines, and in having prominent regular ribs; the whorls are flattened on top, and slightly canaliculated.

T. CURVIROSTRA, Conr. Pl. 30, fig. 69. Miocene, *N. Carolina*.

Genus PYROPSIS, Conrad. Spire very short, apex not papillated; labrum without striæ within, thick; columella without a fold.

P. PERLATA, Conrad. Pl. 30, fig. 70. Cretaceous, *Tippah Co. Miss.*

Genus CLAVIFUSUS, Conrad. The genus has not been characterized.

C. COOPERI, Conrad. Pl. 30, fig. 71. Eocene, *Alabama*.

C. ALTILIS, Conrad. Pl. 30, fig. 72. Eocene, *Alabama*.

Sub-Family PISANIINÆ.

Subgenus CANTHARULUS, Meek. (S. G. of *Cantharus*). Shell with canal moderately produced, rather narrow and twisted; inner lip smooth throughout, and rather well developed; columella arcuate and twisted, so as to form an obtuse, undefined prominence below; outer lip slightly sinuous above.

C. VAUGHANI, Meek and Hayden. Pl. 31, fig. 73. Cretaceous, *Upper Missouri River*.

Genus METULELLA, Gabb. Shell fusiform, canal more or less produced; inner lip covered with a thickened plate, continuous posteriorly with the outer lip. Interior of both inner and outer lips strongly denticulated or transversely striated. Surface cancellate or costate. More distinctly fusiform than *Metula*, the columella with a row of denticles.

M. FUSIFORMIS, Gabb. Pl. 31, fig. 74. Miocene, *San Domingo, W. I.*

Genus LEVIBUCCINUM, Conrad. Not characterized.

L. PRORSUM, Conr. Pl. 58, fig. 412. Eocene, *Alabama*.

Genus AGASOMA, Gabb. Subfusiform, spire low, body-whorl long; canal moderately produced and slightly deflected; aperture elongate, labrum simple; labium incrusted with a thin, smooth plate; suture bordered by an elevated portion of the succeeding whorl as in *Clavella*. It differs

from *Clavella* in the very short spire and in the short and slightly curved canal.

A. GRAVIDA, Gabb. Pl. 31, fig. 75. Miocene, *California.*

A. SINUATA, Gabb. Pl. 31, fig. 76. Miocene, *California.*

Sub-Family BUCCININÆ.

Genus ERIPACHYA, Gabb. Shell short, robust, subovate to subfusiform, spire moderately elevated. Aperture broad, terminating in advance in a very short canal or a mere notch; outer lip simple; inner lip more or less heavily incrusted. Surface marked by longitudinal ribs and revolving lines.

E. PERFORATA, Gabb. Pl. 31, fig. 79. Cretaceous, *California.*

Genus PSEUDOBUCCINUM, Meek and Hayden. Shell oval, thin, ventricose; spire very short; body volution large, not produced below; aperture large, terminating below in a rounded sinus; outer lip thin and simple; inner lip very thin, smooth, and closely and very broadly folded upon the imperforate umbilical region and body volution above, so as to form, with a low revolving umbilical ridge, a kind of profoundly arcuate, strongly spiral, false columella; surface with more or less distinct revolving lines and furrows.

Meek is inclined to believe that *Bullia ampullacea* is a living example of his genus; if so, *Volutharpa*, Fischer, will have priority over *Pseudobuccinum.*

P. NEBRASCENSE, M. and H. Pl. 31, fig. 78. Cretaceous, *Moreau R.*

Genus ODONTOBASIS, Meek. Shell buccinoid-fusiform, spire more or less produced; body volution ventricose, and separated below from the short narrow beak, by a sharply defined, narrow, revolving sulcus, that terminates below at the connection of the outer lip with the canal, in a small tooth-like projection; outer lip thin, smooth within, and nearly straight in outline; inner lip not thickened, but well-defined; columella a little twisted, slightly flattened, and bearing two oblique plaits below, the lower one of which is formed by the raised lower edge of the obliquely truncated columella, and the other, which is very obscure, or perhaps sometimes obsolete, placed a little above the same; surface ornamented by vertical folds and revolving lines and furrows.

This genus referred doubtfully to the Buccinidæ by Meek, seems to unite characters of several different groups; the shell is Buccinoid in form and sculpture, but the fold and tooth remind one of Fasciolariæ, whilst the truncate columella recalls the Nassæ.

O. VENTRICOSA, Meek. Pl. 31, fig. 79. Cretaceous, *Dakota.*

Genus ECTRACHELIZA, Gabb. Shell accuminately oblong, spire elevated (always truncated in the only species known). Surface com-

pressed near the suture. Inner lip incrusted; columella sinuous, short; outer lip produced in advance.

This genus seems to be allied in many of its characters to *Cominella* and *Truncaria*. Like them, it is compressed adjoining the suture. It shows no trace of umbilicus, as seen in most of the Buccinidæ, but its most distinctive character is in its obliquely subtruncated columella, which does not reach to the anterior end of the shell.

E. TRUNCATA, Gabb. Pl. 31. fig. 80. Miocene, *San Domingo, W. I.*

Genus BRACHYSPHINGUS, Gabb. Shell bucciniform, short, robust, thick; spire low; aperture large, notched anteriorly; outer lip simple; inner lip incrusted with a smooth callus; surface longitudinally ribbed or striate. Allied probably to *Cominella* or *Volutharpa*.

B. LIRATUS, Gabb. Pl. 31, fig. 81. Cretaceous, *California*.

Genus LACINIA, Conrad. Globose; pillar lip widely reflected, with a heavy posterior callus; basal emargination profound; base dilated; aperture with a posterior channel; outer lip simple.

L. ALVEATA, Conr. (= PYRULA SMITHII, Lea). Pl. 31, fig. 84. Eocene, *Ala*.

This does not differ very much from the recent *Cominella maculata*, Martyn.

Genus HAYDENIA, Gabb. Shell massive, allied, in general form, to *Oliva*, spire low. Outer lip simple, not thickened nor crenulate; inner lip incrusted, callus marked posteriorly, without teeth or folds; canal slightly recurved; anterior extremity of the mouth notched, and a small sinus at the posterior extremity of the aperture, where the outer lip unites with the body-whorl. Surface ornamented as in some of the Buccinidæ. This curious form is probably a link between *Buccinum* and *Volutharpa*.

H. IMPRESSA, Gabb. Pl. 31, fig. 82. Cretaceous, *California*.

Sub-Family PHOTINÆ.

Genus BUCCITRITON, Conrad. Genus not characterized. One of the typical specimens of *B. Sagenum* has a single varix on the back of the the body-whorl but the other specimens are without it, so that its non-absorption may be regarded as accidental. *B. altum* is a different type of shell entirely, and looks something like a *Truncaria*.

Sagenella, Conrad, also uncharacterized, judging from the type, is identical with *Buccitriton*.

B. CANCELLATUM, Lea (= SAGENUM, Conr.) Pl. 31, fig. 83. *Alabama*.

B. ALTUM, Conr. Pl. 31, fig. 85. Eocene, *Texas*.

Sub-Family MELONGENIINÆ.

Genus **MELONGENA**, Schum.

Kobelt, in his recently published monograph of *Pyrula* (Conchylien Cabinet), adopts that genus, taking as subgenera *Cassidulus* (= *Melongena*), *Myristica*, *Pugilina*, *Volema* and *Hemifusus* These groups which are too closely related conchologically as well as by their lingual dentition, Troschel also places together, but without subordinating them to a higher group. *Pyrula* would, indeed, be an excellent name on account of its acceptance years ago for the major part of the species, but unfortunately the first and only species cited by Lamarck in his original description of the genus is the *Bulla ficus*, Linn., which is a member of the genus *Ficula*, Swainson, over which it has priority, and instead of which it should therefore be adopted. *Cassidulus*, Humphrey, has priority over *Melongena*, but I cannot adopt it as it is a mere catalogue name, not positively identified.

M. PATULA, Brod. and Sowb. Pl. 41, figs. 194–196.

Chestnut-brown, banded with pale yellow or white; aperture and columella orange or yellowish flesh-color.

Length, 4–10 inches. *Panama to Mazatlan.*

The animal has a yellowish, brown-spotted foot, elongate-quadrangular in shape; head long and narrow; siphon chestnut-color; tentacula short, distant, straight, diverging.

Closely allied to the West Indian *M. melongena*, but may be distinguished by its greater size and darker color. This species develops no spines except at the shoulder of the whorl, where they are irregularly produced, few in number, sometimes entirely absent; in *M. melongena.* although some specimens are equally smooth and devoid of spines, there are usually on adult specimens one to three rows of spines on the upper part of the body-whorl, and an additional row half-way to the base of the whorl.

M. MELONGENA, Linn. Pl. 41, figs. 197, 198.

Light bluish or chocolate, with light yellowish, numerous bands; interior yellowish white. Length, 3–5 inches.

West Indies.

See remarks upon preceding species.

M. TUBERCULATA, Anton.

No figure or locality is given with the description of this species; which has not been recognized.

M. CORONA, Gmelin Pl. 41, figs. 199–203.

Bluish or chestnut-brown, with white bands; same color and bands within the aperture. Length, 2·5–4·5 inches.

Florida and West Indies.

The ordinary type of this species has erect or incurved scaly spines on the edge of the square shoulder, usually crowded, with a more or less prominent sub-basal series of spines; sometimes the latter is suppressed and sometimes the upper series is replaced by two less prominent ones.

M. Belknapi, Petit (fig. 201), is synonymous. I figure also a small variety (fig. 200) illustrated recently by Mr. Sowerby in the Proc. Zool. Soc. London.

M. bispinosa, Phil. (fig. 203), is a variety of this species in which the shoulder is encircled by a double girdle of spinose tubercles, the upper one being most prominent. I have several examples of this variety before me from Yucatan.

M. Martiniana, Phil. (fig. 202), appears to be a specimen of this (or possibly of the next) species with the spines almost suppressed.

Fusus bicolor, Say, described from immature specimens, has not been identified properly heretofore: I am glad to be able, from the examination of types sent to the Philada. Academy by Mrs. Say, to identify it with *M. corona.*

M. GALEODES, Lam. Pl. 42, figs. 204–208.

Pale brown, with the revolving ridges darker, or chestnut-brown with the ridges whitish; sometimes uniform cream-color; aperture usually white, brown-banded. The whorls are generally frilled or scaly spinose at the sutural line, nodulous or spinose on the shoulder, and sometimes with one or two lower lines of spines, about equidistant one from another.

Length, 1·5–2·5 inches.

Red Sea, Indian Ocean, Singapore, China, Philippines.

Mr. Tapparone-Canefri, in his review of the Murices of the Red Sea, distinguishes, under the name of *calcaratus*, Dillwyn,

the shell which Lamarck called *Pyrula angulata*, and which Kiener figures (fig. 204). The very numerous suite of specimens before me conclusively shows that all the various forms which I have figured are conspecific.

M. BUCEPHALA, Lam. Pl. 42, fig. 209.

Light yellowish brown, covered usually with a thin, rather smooth, horn-colored epidermis. Length, 3–4·5 inches.

Indian Ocean.

Reeve's habitat "Mexico" is certainly an error.

M. PALLIDA, Brod. and Sowb., Pl. 42, figs. 210–215.

Yellowish white. Length, 1·25–1·75 inches.

Mazatlan, W. Coast of Central America.?

With this species I unite the following as synonyms:

M. anomala, Reeve (figs. 212, 213), which is the adult state of growth—the variability of the species is shown by fig. 213, which Reeve considers a variety of his *anomala*, *M. lignaria*, Reeve (fig. 214), a form which is not adult, and *Fusus Turbinelloides*, Reeve (fig. 215), is older, still not quite adult.

H. and A. Adams erroneously refer *M. anomala*, Reeve, to *Neptunea*, in which the name is preoccupied; they therefore changed it to *Neptunea anceps*.

The species might as well be referred to *Siphonalia* as here.

M. FUSIFORMIS, Blainv. Pl. 42. figs. 216–218.

White, more or less stained with rusty brown, under a fibrous brown epidermis. Length, 2–2·5 inches.

St. Elena, W. Columbia, in crevices of rocks at low water.—Cuming. *Peru.*—d'Orbigny.

This shell is apparently very closely related to *Cuma Kiosquiformis* (Vol. II, p. 200), but the operculum, according to d'Orbigny, is not purpuroid. The resemblance, conchologically, is much nearer *Cuma* than either *Melongena* or *Siphonalia*, and I cannot help thinking that the great French naturalist was mistaken as to the operculum.

M. MYRISTICA, Reeve. Pl. 42, fig. 219.

Yellowish red, white within the aperture. Length, 28 mill.

Hab. unknown.

This, and the two following, are located in *Melongena* with much doubt.

M. CANCELLARIOIDES, Reeve. Pl. 43, fig. 231.

Whitish, ridges reddish brown. Length, 47 mill.

? China.

M. SPADICEA, Kobelt. Pl. 43, fig. 230.

Yellowish. Length, 2 inches.

Hab. unknown.

Kobelt thinks it not improbable that this is an *Austrofusus;* I place it here on account of the coloration which corresponds with *Melongena.*

M. BERNARDIANA, Phil.

Not figured. Said to resemble *Fusus turbinelloides*, Reeve = *M. pallida*, Brod. and Sowb.

Marquesas Isles.

M. PUGILINA, Born. Pl. 43, figs. 220–222.

Chestnut-brown; aperture orange-yellow; epidermis dark brown, pilose. Length, 3-4 inches.

Indian Ocean.

M. PARADISIACA, Reeve. Pl. 43, figs. 223–225.

Whitish or yellowish, either unbanded, or encircled with numerous light brown bands, aperture flesh-yellow to orange; shoulder smooth or defined by low tubercles. Length, 2–3 inches.

Red Sea; Ceylon; Mozambique; Natal.

The specific name is given by Reeve and others as of Martini, who was not a binomial writer. I cannot cite him as authority and in substituting Reeve I pass over several intervening, different names given by other authors: the species is so well known as *paradisiaca* that to change it would be inadvisable. A yellow form, without tubercles (fig. 224), was called by Lamarck *Pyrula citrina;* whilst the tuberculate shells were named by him *P. nodosa.*

M. COCHLIDIUM, Linn. Pl. 43, figs. 226, 227.

Deep chestnut-brown: aperture yellowish or white.

Length, 3·5–6 inches.

Indian Ocean; Raines' Isl., Torres Sts.—Capt. Ince.

Somewhat resembling the dark-colored, tuberculate variety of *M. pugilina*, Born, but a larger shell, thinner, and with the tubercles or short spines larger and much less numerous.

M. MORIO, Linn. Pl. 43, figs. 228, 229.

Chocolate-brown under a rather porsistent olive-brown, pilose epidermis; usually encircled by one or more white bands, the principal one at the top of the aperture; interior light brown or bluish with revolving brown ridges; shoulder with or without rather distant compressed tubercles. Length, 3–7 inches.

W. Coast of Africa; West Indies; Brazil.

This and the preceding species were placed by the Messrs. Adams in the genus *Hemifusus*, but they are quite as closely related in form to *Melongena* whilst their coloration is decidedly that of the latter genus.

M. (MUREX) SQUAMOSA, Brod. Pl. 58, fig. 399.

Yellowish brown; pink tinged, especially on the columella. Length, 40 mill.

Payta, Peru.

This species has been neglected by recent monographers. The only figure is in Sowerby's Conch. Illustrations. The want of real varices and thin outer lip removes it from *Murex*, and it cannot be a *Fusus*, as Sowerby conjectures, that genus being now restricted to the spindle-shaped shells, with long canal. I locate it here, not knowing how to dispose of it otherwise.

M. (PYRULA) PLICATA, Lam.

M. Deshayes has not been able to identify this species.

Genus **HEMIFUSUS**, Swainson.

Besides being thinner, the shells of this genus are distinguished from *Melongena*, by being white (without bands or other color markings) under a light yellowish brown epidermis. They differ from *Fusus* in the flexuous, wider, open canal, which is widened gradually into the lower portion of the aperture.

H. COLOSSEUS, Lam. Pl. 44, fig. 232.

Pale fawn-yellow; light roseate within the aperture. Length, 10–14 inches.

Indian Ocean; Philippines.

Varies in the development of the tubercles upon the shoulder; occasionally they are obsolete, and are never very prominent.

H. TERNATANUS, Gmel. Pl. 44, fig. 233.

Fawn-yellow to yellowish red; interior yellowish flesh-color. Length, 3–5 inches.

Indian Ocean; Philippines.

A smaller, wider shell than the preceding species, with more prominent tubercles.

H. PASTINACA, Reeve. Pl. 44, fig. 234.

Thin; whitish, under a thin, yellowish epidermis. Length, 3·5 inches.

Australia.

I do not know this species.

H. LACTEUS, Reeve. Pl. 44, fig. 235.

Yellowish cream-color, or light chestnut-yellow. Length, 2·5 inches.

Philippines.

I think it very probable that this and the preceding species will prove to be identical.

H. ELONGATUS, Lam. Pl. 44, fig. 236.

Whitish to yellowish orange. Length, 3–4·5 inches.

Indian Ocean.

H. TUBA, Gmelin. Pl. 44, fig. 237.

Yellowish flesh-color, under a brownish yellow, thin epidermis; light flesh-color within the aperture. Length, 4·5 inches.

China; Japan.

The broad shoulder and prominent spines or tubercles well distinguish this well-known species from its congeners.

Genus **THATCHERIA**, Angas.

Shell angularly pyriform, solid; spire prominent, shorter than the aperture, many whorled, whorls flattened above, strongly keeled at the periphery and contracted below; aperture with a broad incurved sinus between the extremity of the last keel and the junction of the body-whorl; basal canal wide and open; columella smooth; outer lip simple below the sinus.

T. MIRABILIS, Angas. Pl. 44, figs. 238, 239.

Yellowish white; aperture white. Length, 3·5 inch.

Japan.

That this shell is a scalariform monstrosity cannot be doubted, but what may be its normal form is not so readily ascertained.

I saw the single specimen from which the above generic description was made, when in London, in 1877, and was immediately convinced that the conical form, flattened shoulders and sinus were all due to distorted growth. In the Annals of the Malacol. Soc. of Belgium is figured a monstrosity of *Strombus Luhuanus*, which I have copied for comparison (figs. 240, 241). I may here also include a notice of *Pyrula Bengalina*, Grat., evidently also a monstrosity.

PYRULA BENGALINA, Grat. Pl. 44, fig. 242.

Thin, fragile, transversely striate; white, maculated with yellowish red; initial whorls cancellated; aperture subviolaceous; lip thin, very acute at edge. Length, 50 mill.

Bay of Bengal.

Genus **NEPTUNEA**, Bolten.

The shells of this genus are boreal in distribution, and like the other circumpolar genera, are nearly destitute of color, being white or yellowish, under a light brown or yellowish, rather smooth epidermis. The sculpture, when there is any, consists of revolving striæ, ridges or ribs, and the lip of the aperture is smooth within or merely modified by the external sculpture when the shell is thin. In the genus *Siphonalia*, the species of which are mainly Japanese and Australian, the general form is similar, but the shell is nodose, frequently developing longitudinal ribs, and the outer lip is more disposed to be crenulate; the surface is more usually ornamented with color, disposed in bands, etc. There are some species which can be only arbitrarily placed, having characters partaking of either genus; and in fact geographical considerations must sometimes be allowed considerable weight in assigning such species to their respective genera.

Some of the species are apparently very variable, and it is difficult to decide whether the conservative views of Gwyn Jeffreys and Kobelt, or the more extreme views of Mörch, etc.. are most in accordance with truth.

N. ANTIQUA, Linn. Pl. 45, figs. 243–246.

Whorls rounded, the apical ones obscurely carinated, closely marked with revolving striæ. White, interior yellowish.

Length, 3·5–7 inches.

The animal has a white or yellowish white body, sometimes partially speckled with black; the sole of the foot often straw color or light orange.

Cornwall (coralline zone) to *Shetland* (there found in the laminarian, and deep water also); *North Sea; Atlantic Coast of France.*

Kobelt has varieties *carinata* and *despecta*, but Jeffreys considers them distinct from this species, of more Arctic distribution, and not found living (although fossil) in the British Isles. I agree with Jeffreys' views. On the other hand, Jeffreys has the following varieties, viz.: *alba*, *ventricosa*, *striata*, *gracilis;* they are merely arbitrary distinctions among forms very variable. Jeffreys also enumerates montrosities, as follows:

N. contraria, Linn. Spire reversed. (This has usually been considered a distinct species, and I prefer to so regard it.) Monstr. 2. *acuminatum;* Monstr. 3. *scalariforme*, whorls more or less detached; Monstr. 4. *cinctum*, with a sharp ridge at the top or in the middle of the lower whorls, now and then bicarinated; 5. *sulcatum*, lower whorls furrowed in the middle, and outer lip notched like a *Pleurotoma;* 6. *Babylonicum*, spire turreted; 7. *compressum*, squeezed in at the sides, mouth narrow; 8. *Volutæforme*, shaped like a *Voluta;* 9. *varicosum*, the former outer lip (sometimes two or three of them) persistent; 10. *contortum*, spire twisted on one side or inwards; 11. *suffultum*, basal ridge continued to the periphery; 12. *bioperculatum*, having two opercula.

The following information concerning this common British shell I obtain from Jeffreys.*

" This is good bait for codfish, and a favorite delicacy of the lower working-classes in London. At Billingsgate it is sold under the name of ' almond ' or ' red whelk ;' according to Rutly's History of Dublin the Irish call it ' barnagh,' the tail (liver) being said to be more fat and tender than a lobster. The egg-cases or capsules (Vol. II, t. 7, f. 11) overlap one another in an imbricated fashion, each being firmly attached by its base to the underlying capsule; they are deposited in clusters of from a dozen to a hundred, the capsules in each cluster being equal in size. Those which compose one cluster, however, are not half as

* Brit. Conch. IV, 326.

large as those forming another cluster, although in both cases the fry are in the same state of maturity. When they are dry, the upper or convex side shrivels, and is wrinkled or pitted; the under or flat side (which by contraction becomes concave) is of a silky texture, and divided across by a few lines; the opening is a wide slit, lying just under the top which makes a narrow flap.

"Before leaving the capsule the fry are perfectly formed, with conspicuous tentacles, eyes, and operculum; their shell has two whorls, the first being smooth, and the other showing a few slight incipient striæ. Each capsule produces only from two to four fry. The latter end of winter appears to be the spawning-season; on the 26th of January, 1861, I examined fresh capsules which contained merely eggs immersed in a glairy liquid; and seven days afterwards I found in the other capsules full-sized and living young whelks.

"The sculpture of the adult shell differs according to the locality and nature of the ground; sometimes it is coarse, and at other times scarcely perceptible. Specimens from Kiel Bay are stunted and depauperated, owing probably to the admixture of fresh water from the Baltic. In Shetland and at Berwick the fishermen make an elegant lamp of the shell, suspending it horizontally, mouth upwards, by a string round the middle, from a nail in the wall; the cavity contains oil, and the canal a wick (See Vol. II, Pl. 2, fig. 13). Now and then giants are seen, 7 or 8 inches long. The body-whorl of the female is larger than that of the male. Chemnitz knew the reversed form as a Crag fossil of Harwich; and he deplored in moving terms the indolence and apathy of naturalists in not procuring live specimens of this 'most delicate monster.' It is still very rare. Not only the spire of the shell, but also the curve of the operculum is reversed. I am not aware of any explanation of the phenomenon having been offered on physiological grounds."

Mr. Crosse considers *N. contraria*, Linn. (t. 50, f. 291, 292), a good species, and not a reversed *antiqua*, because it is so abundantly found at Vigo, a locality more southern than any for the normal *antiqua*, and Weinkauff also, remarking upon the abundance of *contraria* in the Mediterranean and the absence of *antiqua*, comes to the same conclusion.

N. LURIDA, A. Ad.

Shell ovate-ventricose, cretaceous or dirty white, epidermis thin, brownish, spire shorter than the aperture; whorls four-and-a-half convex, the last obtusely subangulate behind; aperture large, ovate, livid within; inner lip smooth, convex, canal very short, open, scarcely reflexed; lip lirate within, towards the margin smooth, behind widely subsinuated.

Japan.

"This is the common edible Whelk of the Ainos." Not figured, nor have I seen it.

N. DESPECTA, Linn. Pl. 45, figs. 247–254; Pl. 46, figs. 255–261; Pl. 47, figs. 262–268.

Shell with a flat shoulder and keel, which is nodulous; surface covered with irregular revolving striæ and riblets; sometimes longitudinally lamellose. Fawn-brown, lighter or whitish within the aperture. Length, 3–5 inches.

Norway; Spitzbergen; Siberia; Japan; Alaska; Greenland; Iceland; Newfoundland.

A circumpolar species, very variable in form and sculpture, and bearing numerous names. It has been confounded with *N. antiqua*, but appears to me to be distinct. It inhabits colder seas, is not found in any portion of the British ocean, but occurs in boreal Asia and America where the *antiqua* is not found.

In the var. *striata* the revolving sculpture is pretty regular, consisting of alternate larger and smaller striæ or riblets, and the shoulder is destitute of tuberculation. The variety *fornicata* (fig. 251) usually has the angle of the shoulder with a stout rib, upon which are compressed tubercles, but the striæ upon the rest of the shell are more or less obsolete; sometimes the angle itself is obsolete and the tubercles form the only ornamentation of the surface. This latter variety is still regarded by some good conchologists as a distinct species; my specimens, however, clearly indicate to me its derivation from *despecta*. Among the synonyms of var. *fornicata* may be placed *Fusus borealis*, Phil. (fig. 554), *Chrysodomus heros*, Gray (figs. 252, 253, 255, 256), an extremely lengthened, non-carinated form, which approaches *Siphonalia Kellettii*, Forbes, *Tritonium antiquum*, Midd., not Linn. (figs. 257–260), some forms of which are suggestive of

lirata, Martyn, from the same localities, *N. arthritica*, Val. (figs. 262, 264), *N. bulbacea* or *bulbosa*, Val. (figs. 265, 266), which is evidently the same as *arthritica*, *Fusus saturus*, Martyn (fig. 267). To these I must add *N. Cumingii*, Crosse (fig. 268), from N. China.

Fusus tornatus, Gould (fig. 261), from codfish at the Bank Fisheries is equivalent to the typical *despecta*.

So variable is this species that I doubt the distinctness of even such diverse forms as *N. lirata*, Martyn, and *Siphonalia Kellettii*, Forbes, as well as of *Volutopsis Behringii*, Midd.

N. LIRATA, Martyn. Pl. 48, figs. 269–272.

Shell light brown, encircled on the body-whorl by nine to fifteen revolving ribs, which are not flattened on the top, usually three of these ribs are visible on the spire whorls.

Length, 3–6 inches.

N. W. Coast of America.

Animal whitish, black-spotted; end of siphon and proboscis black.

Varies by the partial or entire suppression of the ribs as shown by figures 270–272, and then approaches smooth varieties of *N. despecta*. The question of identity of this and the following species has been carefully discussed by Mr. W. H. Dall,* who gives a table of differences in ornamentation and dimensions founded upon the examination of numerous specimens. Mr. Dall remarks that "it should be remembered that *lirata* does not occur on the Arctic shores of North America, and the two species are separated by a vast expanse of water. Some of the characters in the comparative table graduate towards each other in exceptional cases, but the sum of the characters is always sufficient to discriminate between the two, and this is all that can be expected between any two nearly allied forms. I regard the two as perfectly distinct." My material is not so abundant as that on which Mr. Dall bases his conclusions, and the differences are not so great. If it be true that neither species exists on the Arctic Coast, it would have to be proven that they did not exist there at some previous period of the world's history in order to

* Am. Jour. Conch., VII, 108.

indicate distinct origin; we find the same species on both sides of Central America in numerous instances. Perhaps I usually regard species from a somewhat more comprehensive point of view than does Mr. Dall, because in the present case he is quite willing (indeed does not expect otherwise) to distinguish allied species except by the "sum of the characters" of a number of individuals of each, whilst I regard principally those "exceptional cases" where the "characters graduate towards each other" as extremely damaging to their specific distinctness; consequently, whilst Mr. Dall "regards the two as perfectly distinct," I expect future researches to establish their identity. In case they shall be united, Martyn's name having priority, must be adopted.

N. DECEMCOSTATA, Say. Pl. 48, fig. 273.

Shell light brown, aperture usually white, sometimes brownish; encircled on the body-whorl by six to eleven ribs, which, in adults are usually flattened on the top; generally only two of these ribs are visible on the spire-whorls.

Length, 2·5–4 inches.

Massachusetts Bay; Maine; Nova Scotia, etc.

Animal frequently pure white, sometimes flecked with blackish.

See distinctive characters under preceding species.

N. CREBRICOSTATA, Dall. Pl. 48, fig. 274.

Revolving ridges flat-topped and overhanging the interspaces slightly, tops of ridges impressed with one or more lines; embryonic whorls cylindrical, free from strong ridges; canal scarcely produced; siphonal fasciole none or very faint. White, under a yellowish brown epidermis. Length, 3·5 inches.

Unalashka; 100 fathoms.—W. H. Dall.

Mr. Dall remarks that this species recalls *Purpura trochlea;* it is, perhaps, still more like *P. succincta.*

Subgenus **Volutopsis**, Mörch.

The shells of this division are characterized by their large mouths, expanded lips, want of distinctly produced canal, etc. The small operculum is (in *V. Norvegica*) more ovate than in the true Neptuneæ; the dentition also, varies from the typical form. *Volutopsis* appears to stand between *Neptunea* and *Buccinum.*

N. NORVEGICA, Chemn. Pl. 48, figs. 276, 277; Pl. 49, figs. 278, 279; Pl. 50, fig. 288.

Whorls smooth, polished, sometimes very faintly striate; pinkish cream color or white. Length, 3–4·25 inches.

North Sea Coast of England; Shetland Is.; Greenland; Iceland; Newfoundland; Norway (100 fathoms); *Sea of Okhotsk; Alaska.*

The animal has a pale orange or yellowish white body, irregularly streaked with purple. "The egg-cases are solitary. Each forms a compressed hemisphere about one inch in diameter, dirty lemon color, semi-transparent, and attached by the whole of its base to the inside of old bivalve shells and other flat substances, and edged by a rim or strip of membrane. The upper surface is covered with a thin whitish crust, which breaks up into crystalline particles and is finely corrugated; the under side is satiny. Ova pink or bright flesh-color. There are in each capsule from two to four perfect fry, which make their escape through a slit in the rim. The shell has the expressive name of 'wide mouth' among the North-country fishermen."*

Occurs fossil in the glacial shell mounds at Udevalla; and in England in the Norwich Crag. At the former locality the spire is somewhat longer, approaching the next species.

N. Largillierti, Petit, from Newfoundland (fig. 278), is considered by its author a synonym of this species; nevertheless Kobelt has figured and described a specimen (fig. 279) which differs still more than Petit's type from the normal *Norvegica*, and which he thinks is distinct; it approaches the next species in form.

I can scarcely doubt the identity with this species of *N. regularis*, Dall (fig. 271), which, by a curious error, was described as a var. of *N. Beringii*, Midd., supposed by him to be equivalent, or nearly so, to *N. Norvegica*. It comes from Unalashka, etc., and appears to be a stunted form.

N. TURTONI, Bean. Pl. 48, fig. 275; Pl. 49, figs. 281–283.

Shell whitish, spirally striated. Length, 3·5–4·75 inches.

North Sea, English and Norwegian Coasts,
coralline zone to 100 fathoms.

Animal white with purple markings.

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* Jeffreys Brit. Conch., IV, 331.

The much produced spire and very short canal serve to distinguish this from the preceding species. The egg-capsules, according to Jeffreys, "are pale orange, either solitary, or two together, and attached side by side, not to each other, but to a rather broad membraneous substratum; they are triangularly oval, the base being the narrowest part, and consist of an outer filmy sheath and an inner and thick fibrous case; the latter resembles in structure a cocoanut husk; the opening is a wide slit at the top. Mr. Howse found six young in one capsule. The fry are almost cylindrical, and of a dark reddish brown hue. The shell goes by the name of 'long neck' among the Straithes fishermen."

Sars has separated this shell from *Neptunea*, appropriating to it the generic name *Chrysodomus*, Swainson, a name usually considered synonymous with *Neptunea*. The distinctive points are, of the shell as stated above, a somewhat different dentition (Pl. 26, fig. 16), and operculum (fig. 283). I suppose that these characters might be sufficient for the separation of a group, but the opercula and dentition of so many species of Neptuniinæ being unknown, it is perhaps most advisable to make no separation at present.

N. CALLORHINA, Dall. Pl. 49, fig, 287.

Shell white, solid, smooth, with faint traces of revolving striæ; spire acute; embryonal whorls very minute, not mammillate; suture distinct, not channelled; canal very short, wide, straight; aperture rounded, outer lip thickened, strongly waved behind; posterior angle not acute; whorls, seven evenly tapering, not inflated. Length, 2 inches; width, ·9 inch.

St. Paul Island, Behring Sea.

Found two specimens dead, on Fur Seal Rookery. The apex alone would distinguish it from any described species.

The above is Mr. Dall's description. I have not seen it.

N. HALLII, Dall. Pl. 49, fig. 285.

Suture subcanaliculate, not deep, but very distinct; canal rather long (says Dall, but his figure does not show it so). White, covered with a yellow-brown epidermis, with very faint revolving striæ crossing the slightly evident, waved lines of growth.

Length 1·7 inch., lat. ·8 inch.

Alaska.

N. ATTENUATA, Dall. Pl. 50, fig. 296.

Shell solid, pinkish white, much attenuated before and behind; spire one-quarter shorter than the aperture. Whorls six, apex mammillated. Posterior surface of the valves flattened towards the suture, where they are somewhat wrinkled and appressed. Surface of the whorls completely covered with fine, even, spiral lines. Aperture long and narrow, a thickened callus on the inner lip, and the outer lip slightly reflected. Canal long, nearly straight, rather narrow. Length 2·33 inches, lat. 1 inch.

Behring's Strait.

I do not know this species. The long canal is a feature not consistent with *Volutopsis;* nevertheless, Mr. Dall places it here. Is it not equivalent to the next species?

N. PERICOCHLION, Schrenck. Pl. 49, figs. 284, 286.

Shell canaliculate, spirally striate, white under a yellowish or reddish brown epidermis. Length, 4 inches.

Japan.

N. tabulata, Baird (fig. 286), of which a single dead specimen was dredged in Esquimault Harbor, Vancouver's Island, may be synonymous with *N. pericochlion*. It has six whorls, flattened above and canaliculate next the sutures, covered with revolving striæ, which are asperate; the canal is of considerable length, bent to one side. Length 3 inches, lat. 1·33 inches.

Carpenter mentions a second dead specimen, dredged at 120 fathoms, Catalina Isl., Cal.

N. BEHRINGII, Middendorff. Pl. 49, fig. 280; Pl. 50, figs. 289, 290.

Shell ovate-fusiform, rather solid when adult, whorls obtusely shouldered, irregularly plicate longitudinally, with minute revolving striæ, which are lost on the middle of the body-whorl but become more conspicuous at its lower part. Yellowish white; epidermis deciduous, membranaceous, brown.

Length, 4–5 inches.

Behring's Sea.

The rudely folded whorls are the distinguishing characteristic of this species: of which there is a short-spired variety, *N. castanea*, Mörch, which equals *N. Kennicottii*, Dall (fig. 290).

Subgenus **Heliotropis**, Dall.

The essential character of this group is the reversed direction of the spire, placing the aperture on the left instead of the right side of the shell. The principal species have been considered by good conchologists as mere monstrosities of dextral species; thus Mr. J. Gwyn Jeffreys regards *N. contraria* as equivalent to *N. antiqua*. But of this species it has been shown that it has an extensive distribution in Southern Europe, where the normal *N. antiqua* is unknown, and that the so-called reversed *antiqua* is very rare where the normal form is abundant. The last two species, in form and want of defined canal appear like reversed Volutopsæ, and possibly they are.

N. CONTRARIA, Linn. Pl. 50, figs. 291, 292.

Pale yellowish to fulvous brown; whitish within.
Length, 3–4 inches.
Atlantic Coast of Spain, Portugal, South France; Mediterranean?

Fossil in the English Crag, in Belgium, and in the newer Tertiary at Palermo.

See remarks under *Heliotropis*, above; yet the so-called English specimens may be veritable reversed monstrosities of *N. antiqua*.

N. DEFORMIS, Reeve. Pl. 50, fig. 293.

Rather thin, with fine revolving striæ, and tubercularly swollen beneath the sutures. Yellowish chestnut. the columella and part of lip-margin white. Length, 3 inches.
Spitzbergen.

N. HARPA, Mörch. Pl. 50, figs. 294, 295.

Yellowish white, salmon within the aperture.
Length, 3·75 to 6 inches.
Sitka.

Closely allied to the preceding species. Mr. Dall remarks that the "operculum is very small when compared with the size of the animal. Ovicapsules solitary, of hemispherical form, attached by the entire base, smooth above, and maturing only two or three individuals to each sac, although of much greater size than the ovicapsule of any other species of mollusk in the region."

Undetermined Neptuneæ.

N. DOMINOVÆ and N. LAMNIGERA, Valenc. The first said to belong to the group of *Fusus bulbaceus*, the last to that of *F. despectus*.

Gulf of Tartary, Mantchuria.

N. ARGYROSTOMA, Lam. H. and A. Adams' Genera.

I do not find any species of this or similar name in the Hist. An. sans Vert.

N. ANGULATA, Gray.

Shell ovate, acute, smooth, rather solid, brownish white; the spire elongated, rather longer than the mouth and canal; apex blunt; whorls convex, rounded, with five or six subequal narrow elevated spiral ribs. The mouth small, roundish ovate; the canal short, rather twisted, open. Length, 2·14 inches.

North Sea.

Genus **SIPHO**, Klein.

This is one of the most perplexing groups that I have studied; the distinctive characters of the so-called species are comparative only, having mainly reference to the proportions of the shells, color and sculpture being nearly identical throughout. Experience with boreal shells teaches that they are much more liable to variation in form than those of more temperate latitudes: hence the conclusion is irresistable that nearly all the species of *Sipho* must be relegated to the synonymy eventually. The want of sufficient and authentic material has prevented me from doing this in several instances. The species are confined to the boreal seas of the northern hemisphere.

* *Shell smooth, with revolving striæ.*

S. ISLANDICUS (Chemn.), Auct. Pl. 51, fig. 297.

White, under a thin fawn-color or yellowish brown epidermis. Length, 4–5 inches.

North Sea; N. Atlantic Ocean to Iceland and Greenland; 30 to 100 fathoms.

It is much larger than the next species, *S. gracilis;* is more spindle-shaped, being produced and attenuated towards the base; the canal is much longer, and in some specimens quite straight;

the whorls are more rounded; the apex is stiliform and prominent; and the ridges are less crowded, and are sharper and more raised, especially on the upper whorls. The odontophores of the two species also differ. The true *Islandicus* is a northern species, very rare upon the northern confines of Great Britain. The English species usually known under this name is the *S. gracilis*, whilst the American species commonly known as *S. Islandicus* is *S. Stimpsoni*, Mörch. The name of *S. cornea*, Linn., is excluded because it is believed to have covered more than one species.

S. GRACILIS, Da Costa. Pl. 51, figs. 298, 299, 311.

White (rarely with a tinge of flesh color) beneath a membranous, yellowish brown or lemon-colored epidermis. Length, 3 inches.

Great Britain, 20 to 145 fathoms, rare in the South, and on the *Coast of France; Sweden; Norway; Iceland; Massachusetts; Behring's Straits?*

Jeffreys describes a var. *convoluta*, which is smaller, narrower, and somewhat cylindrical, more solid, with a longer spire, having sharper ridges and a deeper suture; mouth proportionally smaller. He thus describes the egg-capsules.

"The capsules are solitary, small, membranous, pouch-shaped, and attached by a broad base to stones and corallines; their surface is microscopically and closely reticulated; orifice extremely large and sometimes having the edge partly stained with pink. Each capsule contains only a single embryonic shell, which is transparent, and through it may be seen the orange liver and two unequal-sized plumes of pale yellow gills."

"Monstrosities now and then occur, viz., some of the ridges being prominent and keel-like; spire twisted on one side or downwards; penultimate whorl swollen; apex broken off and replaced by a shelly plug; or the operculum aborted and concave. This whelk is occasionally brought to Billingsgate (London) market, mixed with the common eatable kinds; but it is not saleable. The fishermen call it 'borer.'"

Kobelt considers the *Fusus Islandicus* of the American coast the equivalent of this species, and calls it var. *ventricosior;* but two species appear to be confounded in our "*Islandicus:*" a form which can be readily referred to *S. gracilis*, and a much larger, more ventricose form which has been separated as a distinct species under the name of *Stimpsoni*, Mörch.

S. PROPINQUUS, Alder. Pl. 51, figs. 300, 301.

Resembling *S. gracilis* in shape, but narrower, thinner, less opaque, and somewhat more glossy, the whorls not so convex, the outer lip not projecting so much and more contracted or incurved above. Length, 1·75 inches.

Great Britain, muddy and sandy ground in the coralline and deep-water zones; *Norway; Sweden; Nova Scotia?*

Jeffreys says, "The shell of the female is more tumid than that of the male. Capsules solitary, and attached to the inside of old bivalves; they are hemispherical, and resemble those of *F. gracilis*, but have a smaller and oval orifice; the base is margined by a narrow membrane. Embryo the color of a pomegranate. The smaller size and more delicate texture, finer and closer sculpture, longer, turreted, and regularly tapering spire, deeper suture, hispid epidermis, less abrupt curvature of the canal and especially the symetrical apex will readily serve to discriminate this from the last species."

Mr. Verrill has obtained from the waters of Nova Scotia two shells which are referred by Mr. Dall to this species after direct comparison with authentic specimens thereof.

N. Ebur, Kobelt, non Mörch (fig, 301), described as a white, polished variety, with more acute spire and less incurved canal, was probably, as suggested by Mörch, polished in the stomach of a fish.

S. TORTUOSUS, Reeve. Pl. 51, figs. 302, 303.

White, under a thick, olive epidermis. Length, 42 mill.

Arctic America; Norway.

Var. TURRITA, Sars. Pl. 21, fig. 304.

Smaller and thinner, more slender and almost cylindrical, with a larger spire.

Shetland; Norway.

Jeffreys considers this a variety of *S. propinquus*, Alder; which it may well be, but it is certainly more closely allied to *S. tortuosus* if the shape of canal is a specific character: I think all these differences of extremely doubtful persistence, and would prefer to consider most of the so-called species mere modifications of *S. Islandicus.*

Var. ATTENUATA, Jeffreys. Pl. 51, fig. 305.

"Differs from the type in being narrower, canal not so tortuous," etc. Length, 43 mill.

Norway; W. Coast of Ireland 1180–1215 fms. (Porcupine Exped., 1869); *Bay of Biscay*, 1207 fms.

S. GLABRA, Verkrüzen. Pl. 51, figs. 306, 307.

I cannot find any characters by which to distinguish this satisfactorily from *S. Stimpsoni*, Mörch—the American representative of *S. Islandicus*. Length, 65 mill.

Coast of Norway.

S. JEFFREYSIANUS, Fischer. Pl. 51, fig. 308.

Shell differing from that of *S. propinquus* in being much larger, more ventricose and solid, and in having a conical and shorter spire; the whorls are more convex, and the last occupies eight-elevenths of the shell; the ridges of the back of the canal are stronger; the surface is covered with microscopic spiral striæ, which intersect the equally fine lines of growth, so as to produce a slight and partial decussation; The epidermis is membranous and deciduous, fibrous near the outer lip, never hispid, and of a brownish yellow color; the alternation of size in the spiral ridges gives a lineated appearance to that part of the epidermis on the body-whorl which is of a paler color and situated below the periphery; the canal is proportionally shorter, much wider, and more open; the outer lip is sinuated in the middle; operculum amber-color. Length 2·25 inches, breadth 1·15 inches.

English Coast to Bay of Biscay; coralline zone.

The description above is copied from Jeffreys, who first described the species under the name of *Fusus Buccinatus*, Lam., which is, however, an *Euthria*.

S. STIMPSONI, Mörch. Pl. 51, figs. 309, 310, 313; Pl. 52, fig. 317.

This is the North American representative of *S. Islandicus*, and it has generally been confounded with that species; it is, however, more ventricose, with a shorter, wider and more curved canal. It is a robust shell, with a dark, rough epidermis.

Long Island to Massachusetts, northwards to *Labrador;* deep water.

The animal is white, with small, irregular black specks; eyes black; foot rectangular, angles rounded.

Var. STRIATUS, Reeve. Fig. 317.

Approaching *S. Sarsii* and *S. ventricosus*. Reeve's figure is different enough to be a distinct species from *Stimpsonii*, but I possess a good series of intermediate forms.

S. TURGIDULUS, Jeffreys. Pl. 52. figs. 314, 315.

Shell very thin, white, under a thin yellowish olive epidermis. Length, 47–56 mill.

N. Atlantic Ocean, 290 to 400 fathoms (Porcupine Exped.).

S. SCHANTARICUS, Middendorff. Pl. 52, fig. 316.

Shell opaque, thick, spirally lirate, canal very short. Length, 72 mill.

Sea of Ochotsk.

S. TOGATUS, Mörch. Pl. 52, figs. 318, 319.

Thin, epidermis coriaceous, at the intersection of the revolving and incremental striæ sometimes ciliated. Length, 48 mill.

Arctic Seas; circumpolar.

Several authors identify with this species the unfigured *Fusus Sabinii*, Gray, described in the Conchology of Parry's Voyage; others have identified it with *Buccinofusus Berniciensis*, King. I very much doubt the distinctness of *S. turgidulus* from *togatus*.

S. PFAFFII, Mörch. Pl. 52, fig. 320.

Thin, fragile, rosy white; epidermis brown, membranaceous, ciliated; spirally striated, decussated by growth striæ. Length, 57 mill.

Jacobshavn, Greenland.

Mr. Gwyn Jeffreys refers this, together with *tortuosus*, *Spitzbergensis* and *Ebur* to *S. Sabinii*, Gray, with which he also identifies *togatus*, Mörch. He says, "The epidermis is usually smooth; but in one of my specimens it is finely and closely ciliated. The comparative length and curvature of the canal are variable characters."

S. LIVIDUS, Mörch. Pl. 52, fig. 321.

Whitish, encircled by narrow, flat liræ and narrower interstices; epidermis olivaceous; lip slightly expanded. Length, 50 mill.

Newfoundland.

Mörch mentions the resemblance of this species to *Spitzbergensis*, Reeve (= *Buccinofusus terebralis*, Gld.), the type of

which he has not seen. It is possible that the two are identical, and that *lividus* should be expunged from the genus *Sipho*. It must be considered a very doubtful species; I am not aware of anything like the figure in the American Seas, and cannot help thinking that the illustration is a bad one.

S. Sarsii, Jeffreys. Pl. 52, figs. 322, 323.

Spirally costulate, clathrate by narrow, undulated growth-lines. White, epidermis pallid olivaceous. Length, 54 mill.

Southern Norwegian Coast; 106 fathoms.

Outline somewhat like that of the next species, but the spire is more elevated and the whorls rounder; sutures, consequently, deeper.

S. ventricosus, Gray. Pl. 52, fig. 324.

Shell rather thin, inflated, spire short; epidermis light olive. Length, 1·5–2 inches.

Banks of Newfoundland.

Fusus striatus, Reeve, is supposed by Kobelt to = this species, but I think it more closely allied to *F. Stimpsoni*, Mörch.

S. lachesis, Mörch. Pl. 51, fig. 312.

Pinkish white under a coriaceous epidermis. Length, 41 mill.

Greenland; Finmark.

S. Verkrüzeni, Kobelt. Pl. 52, fig. 325.

Shell solid, nearly smooth; canal very short; columella strongly callous below. Epidermis smooth, greenish yellow. Length, 2 inches.

Northern Norway.

Totally different from all the other species in its *Bullia*-like aspect, want of striæ and short canal. The radula and operculum are those of *Sipho*, otherwise its generic position would be very doubtful. Kobelt suspects that Chemnitz had this shell before him when he assigned Norway as a habitat for *Bullia polita*.

S. roseus, Dall. Pl. 52, fig. 329.

Shell small, of a rosy color when fresh, smooth to the touch, elegantly proportioned. Whorls six, well-rounded but not inflated; suture distinct; apex not mammillate, but evenly and elegantly rounded off. Sculpture consisting of delicate, evenly-

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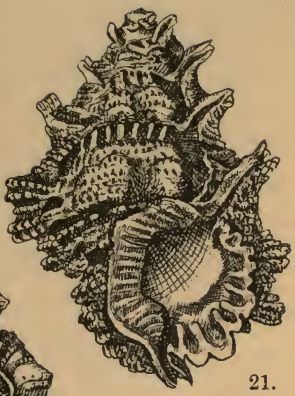

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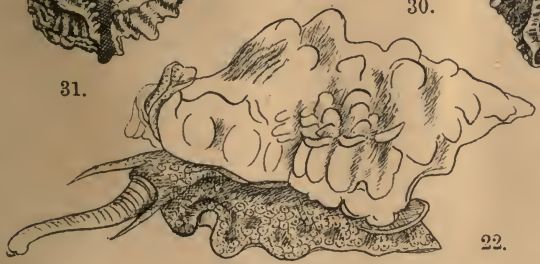

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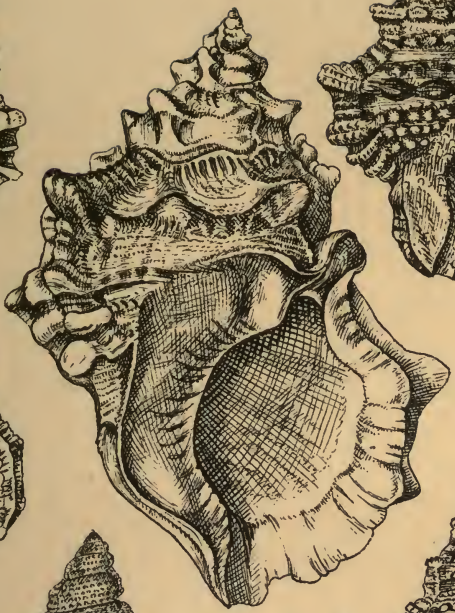

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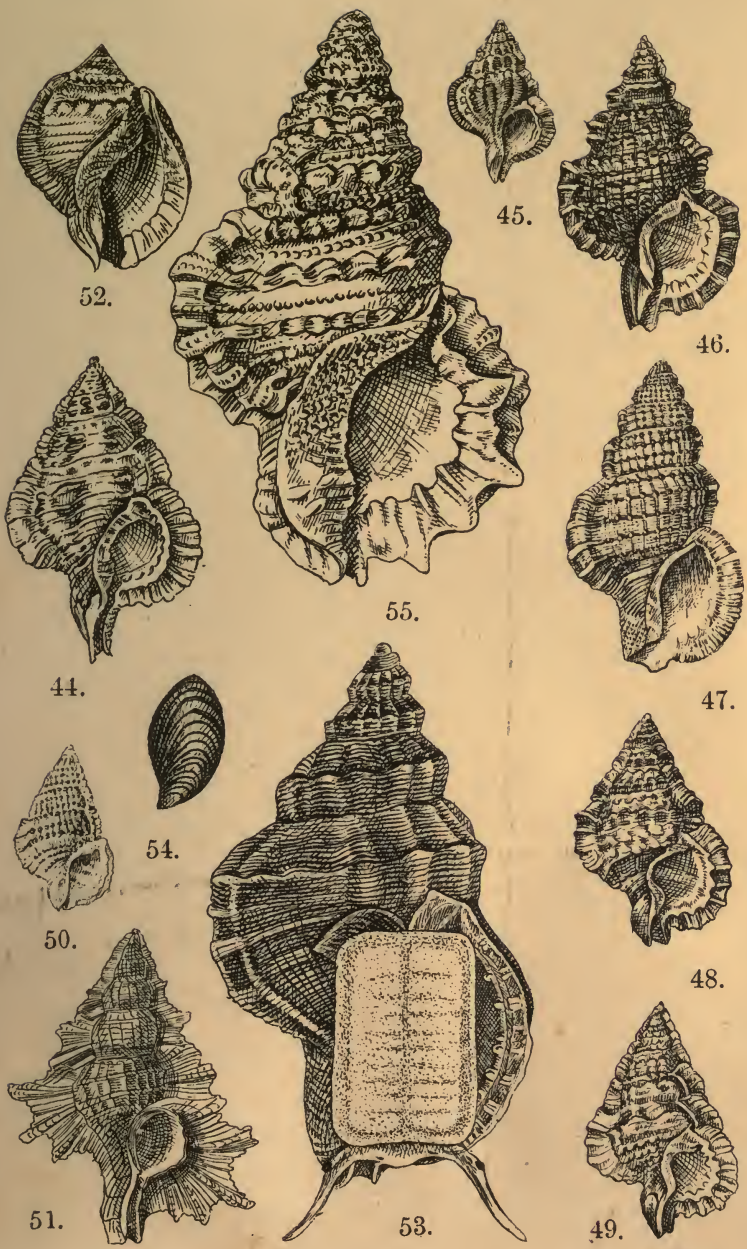
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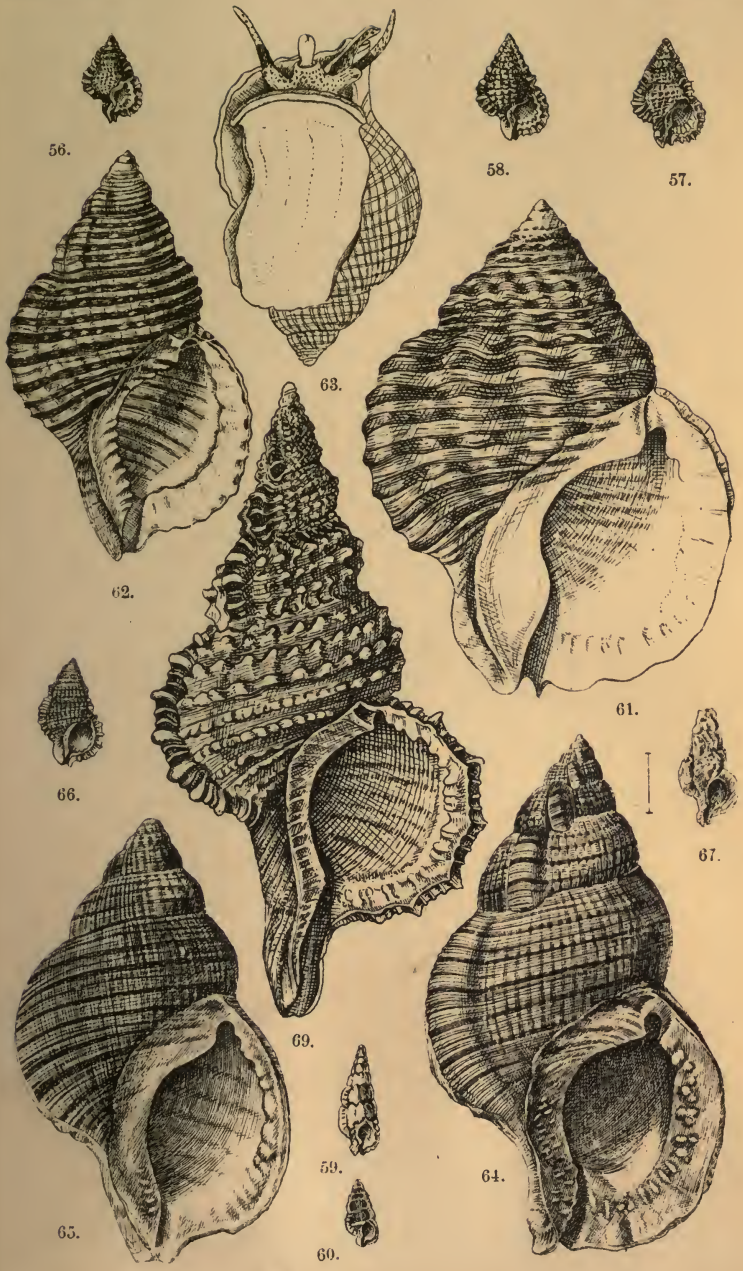
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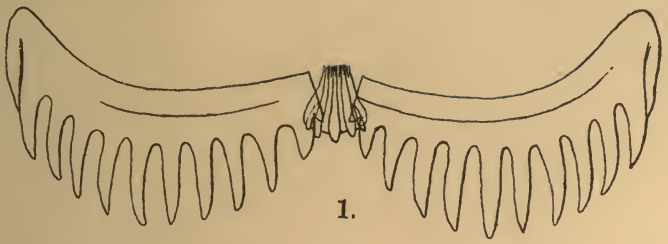

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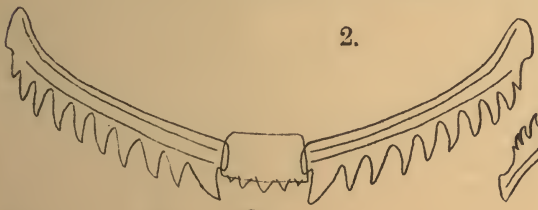

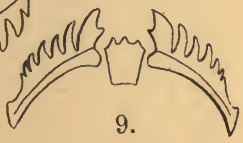

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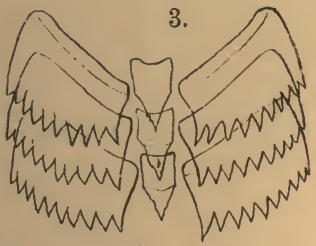

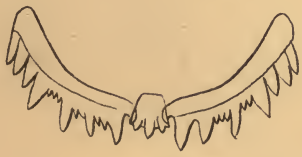

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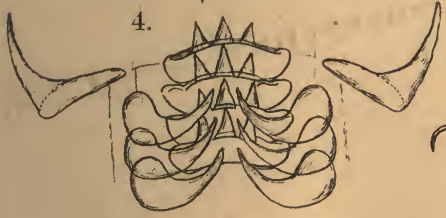

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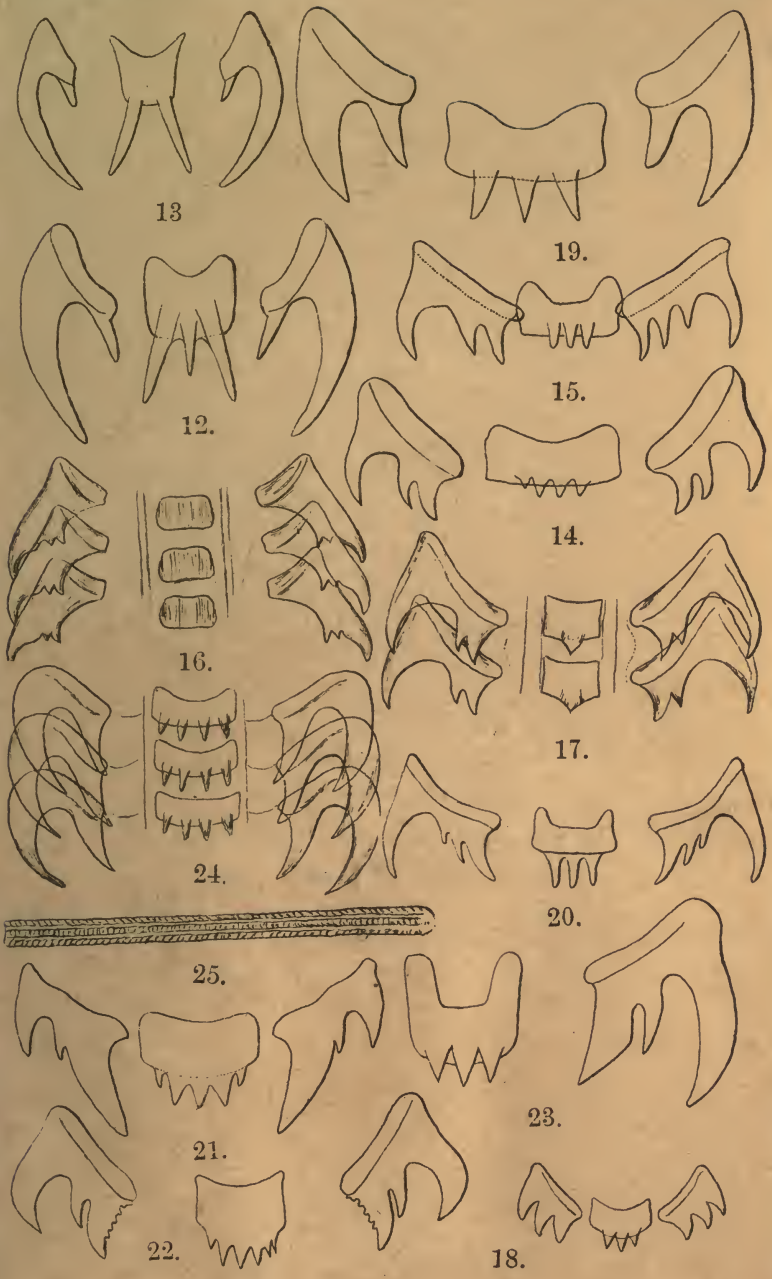
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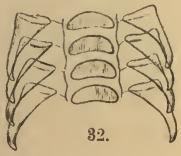

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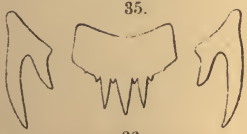

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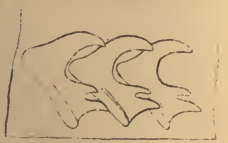

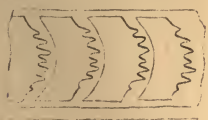

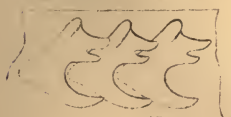

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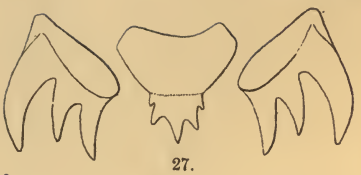

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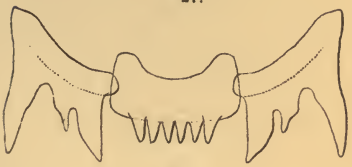

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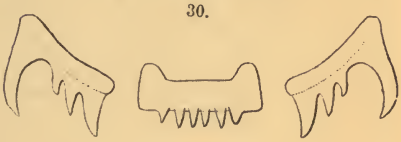

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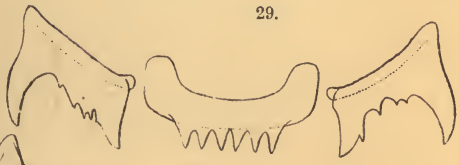

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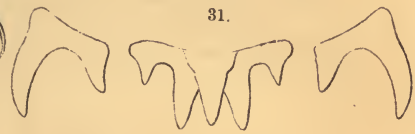

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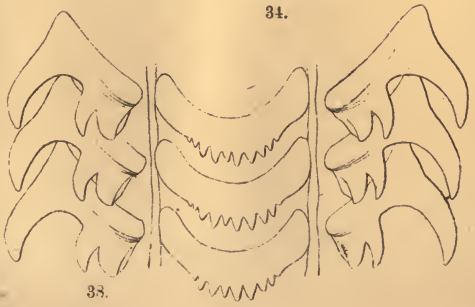

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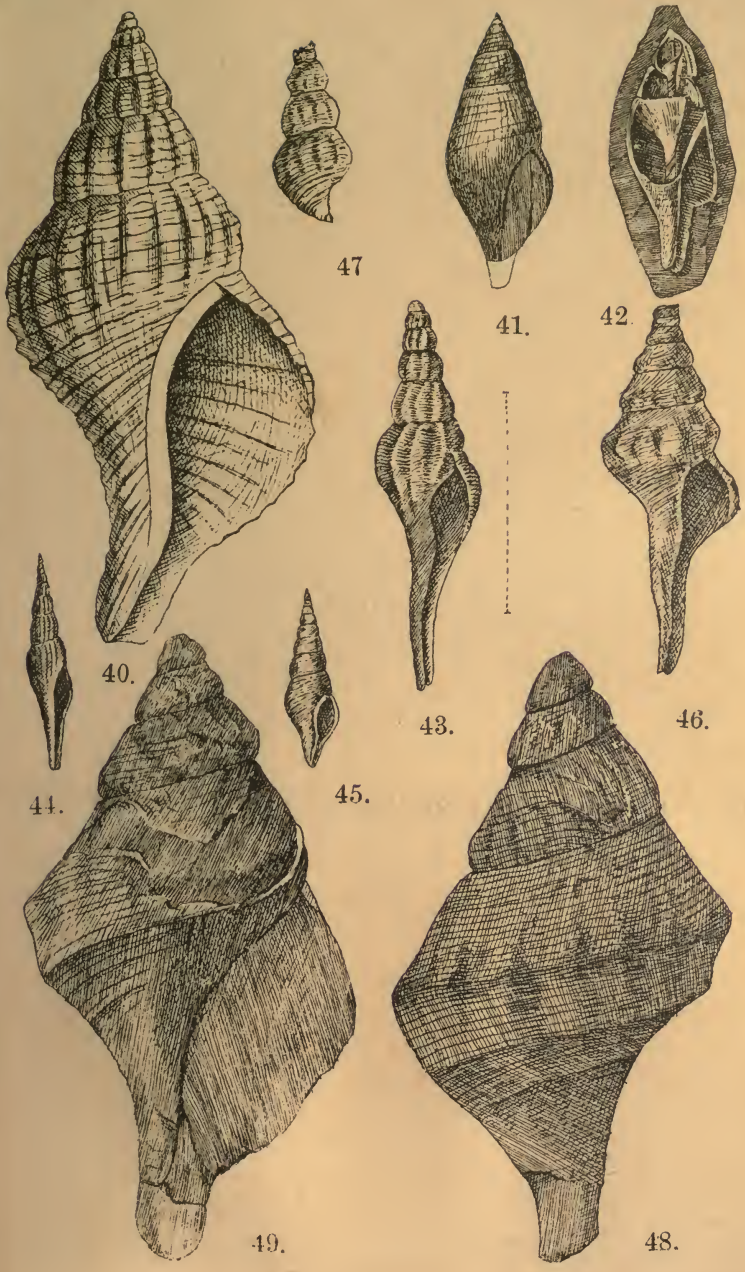
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PLATE 29.

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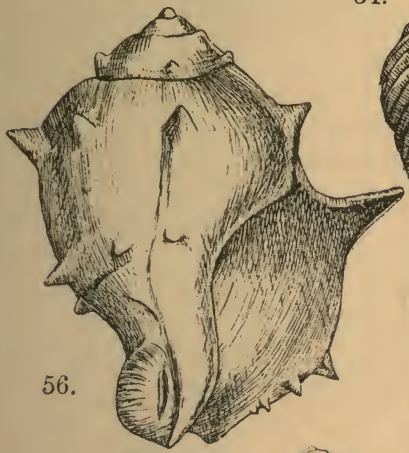

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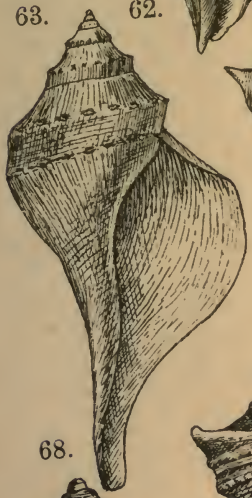

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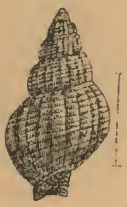

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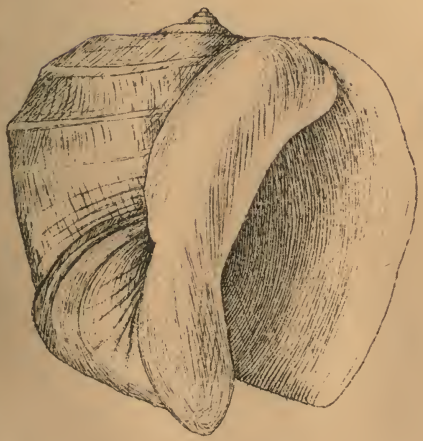

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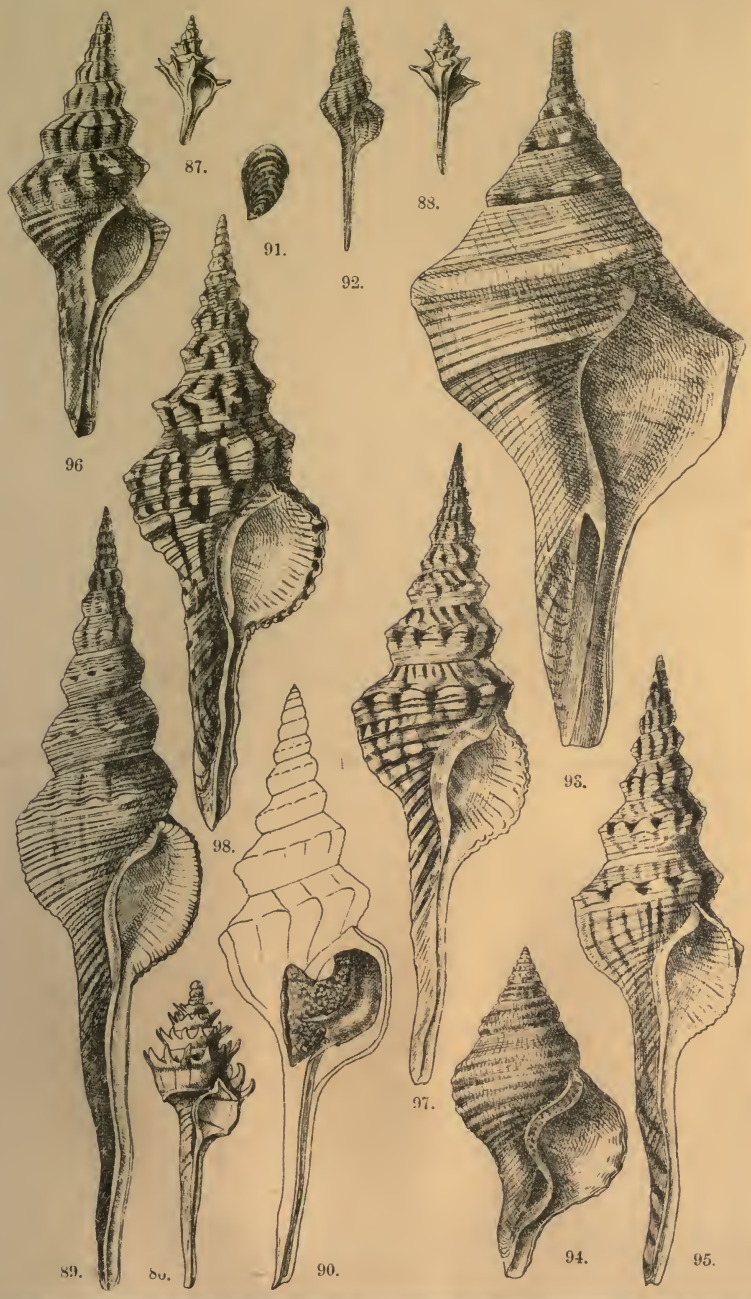
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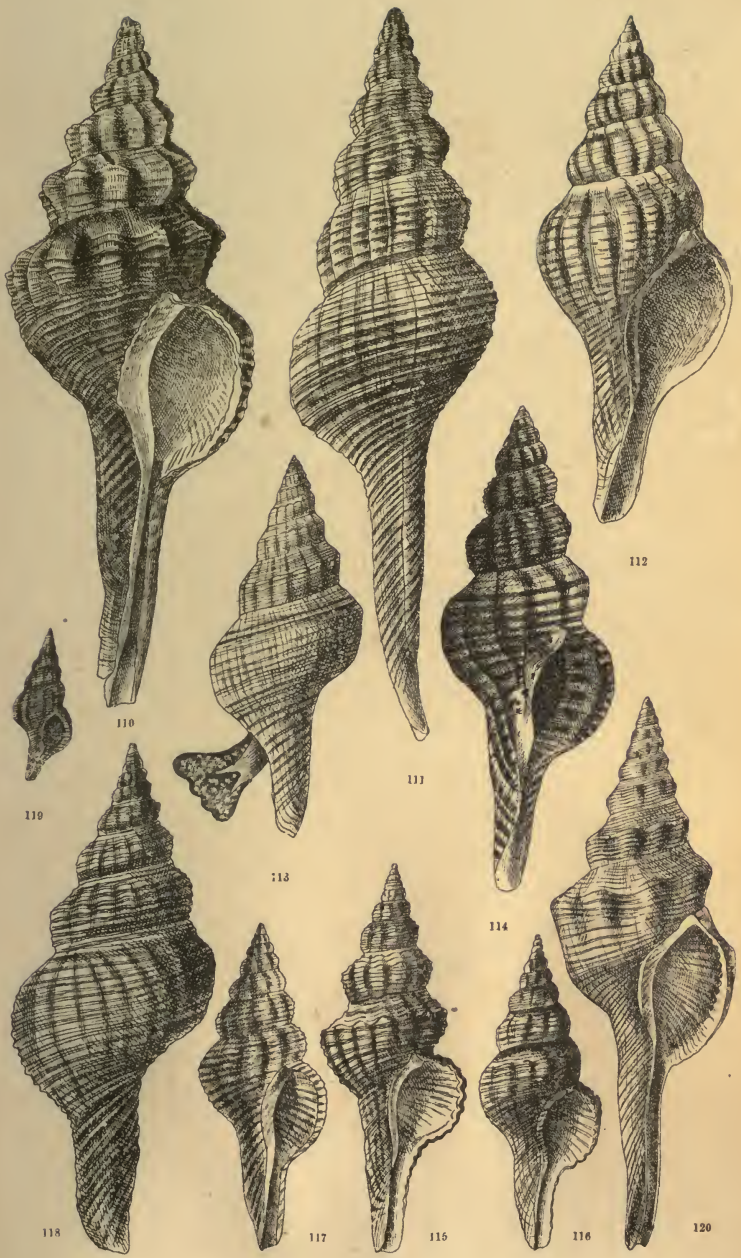
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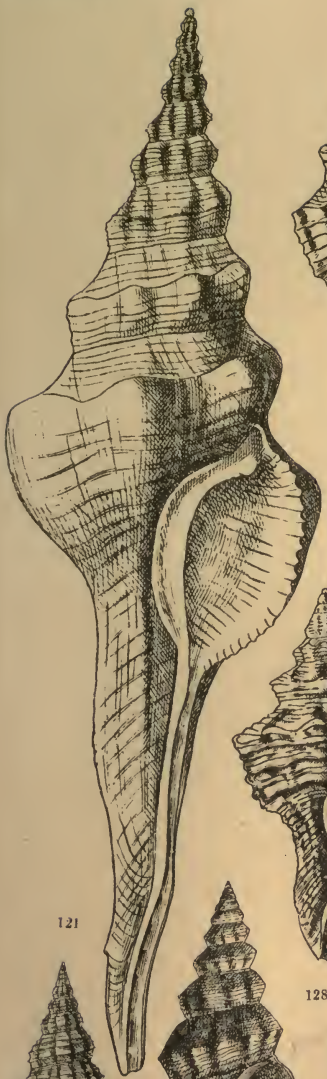

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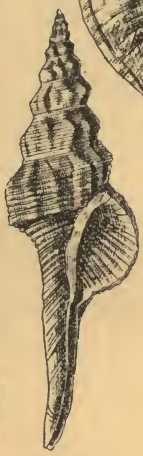

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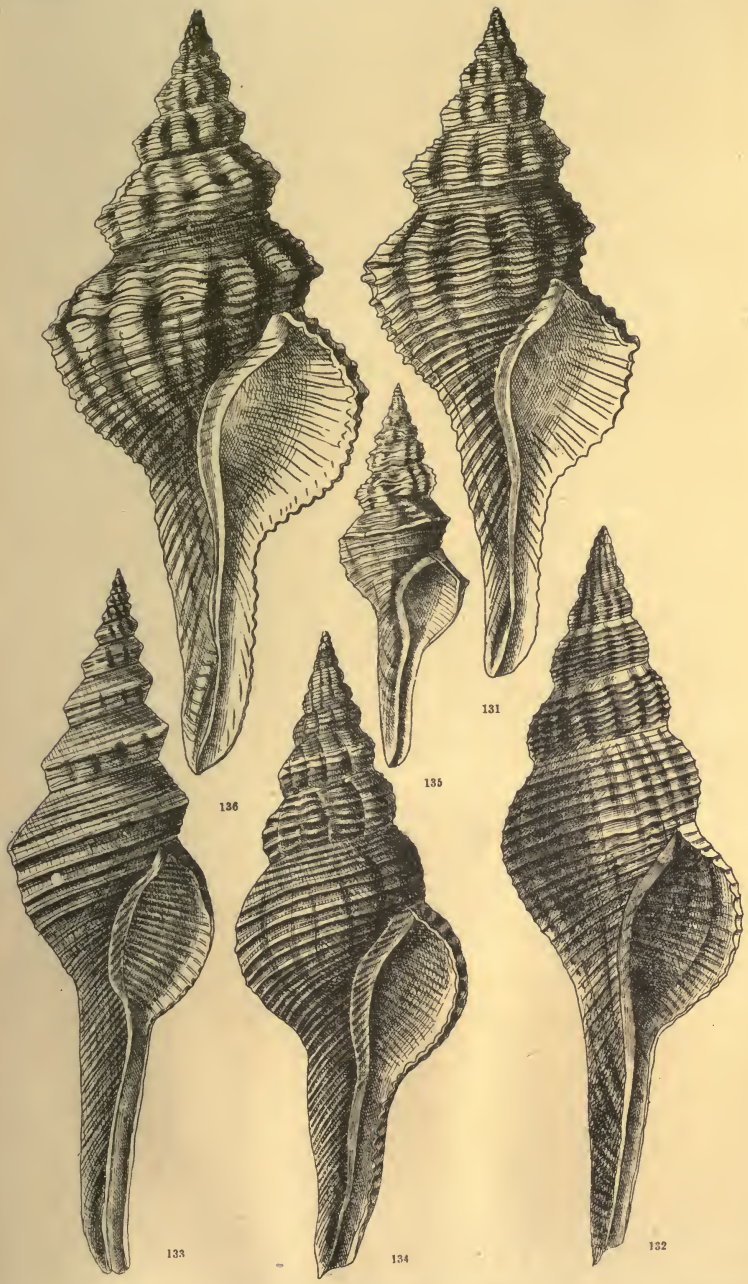

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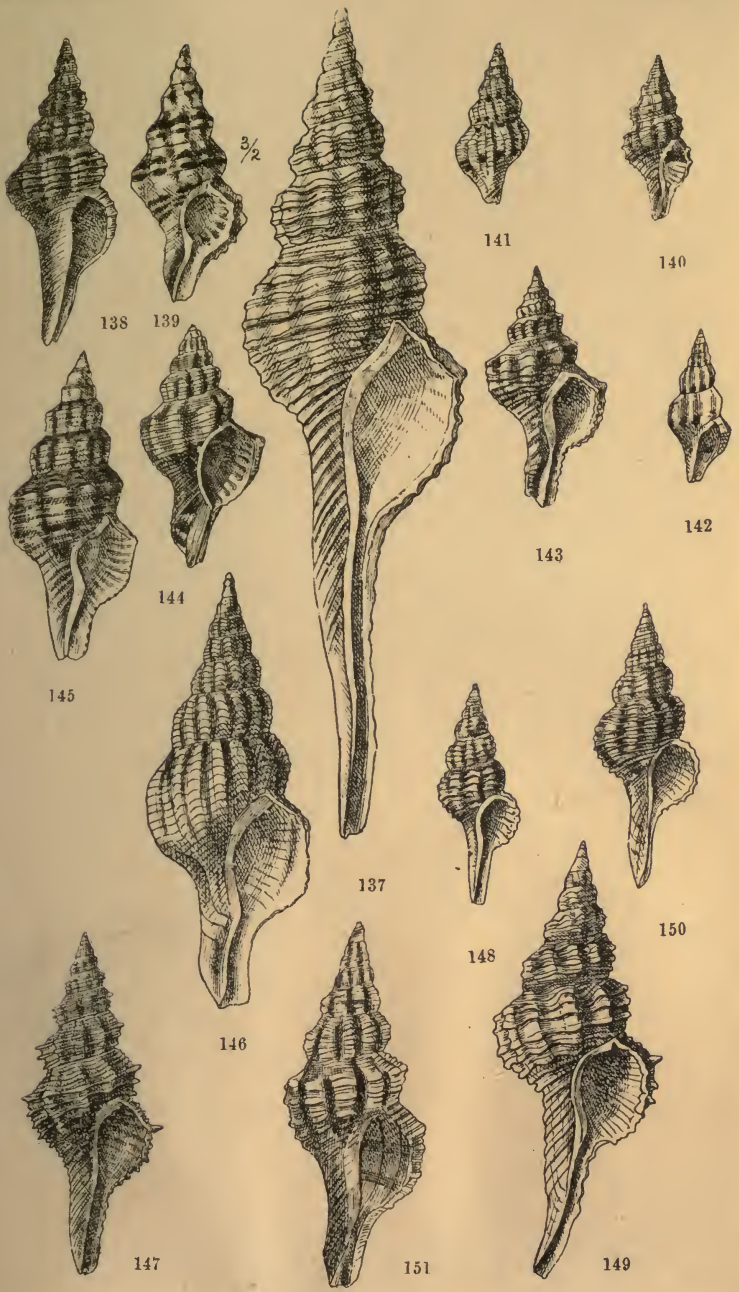
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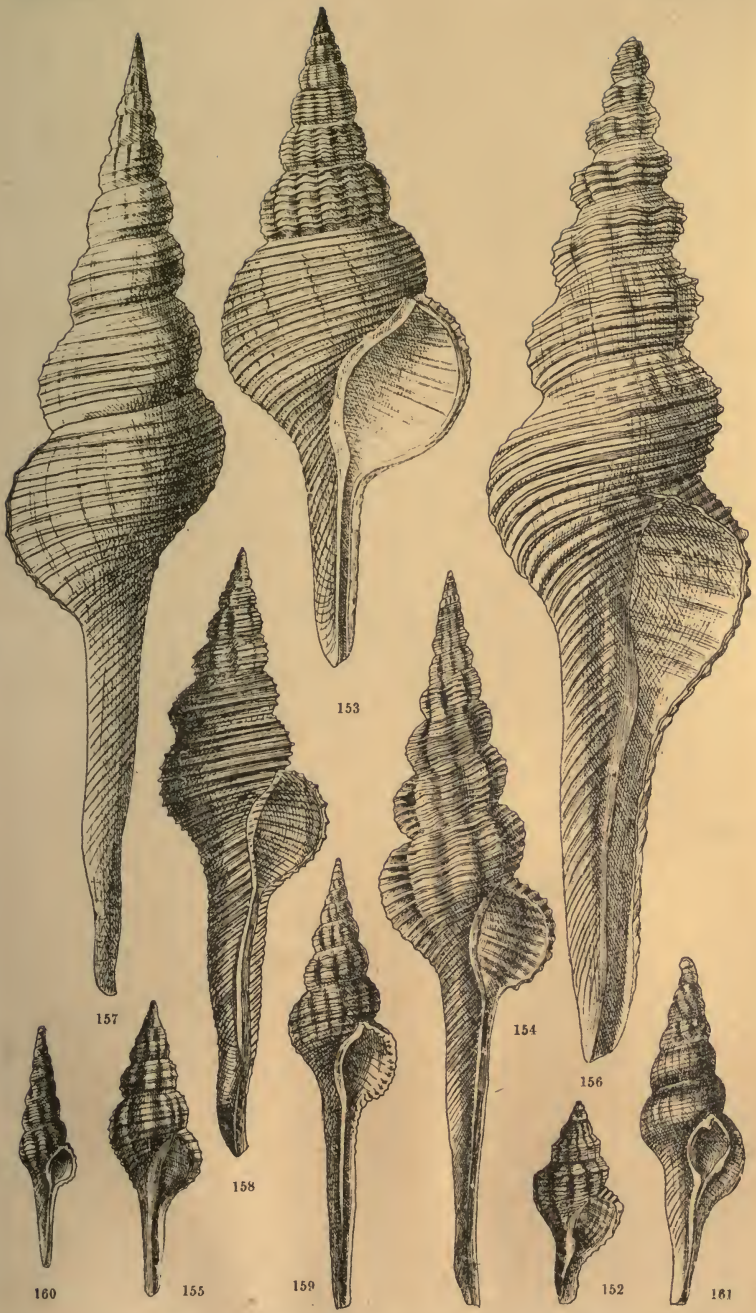
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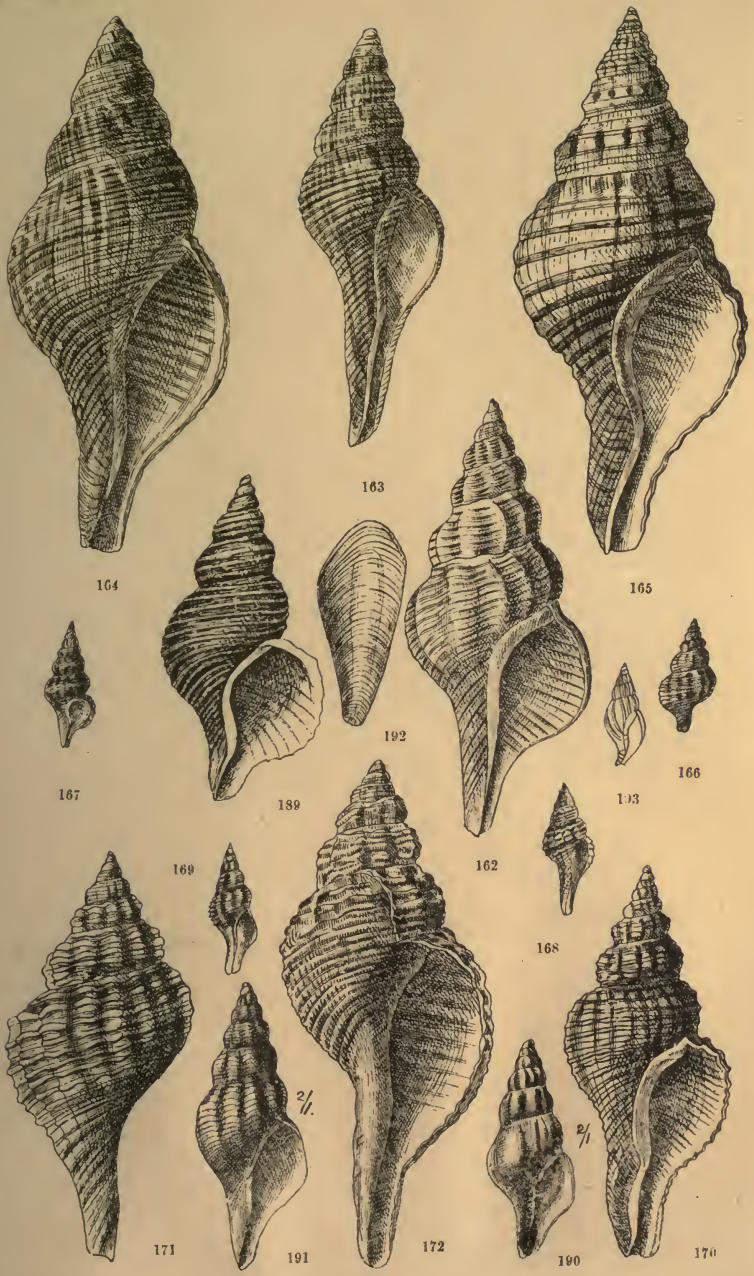
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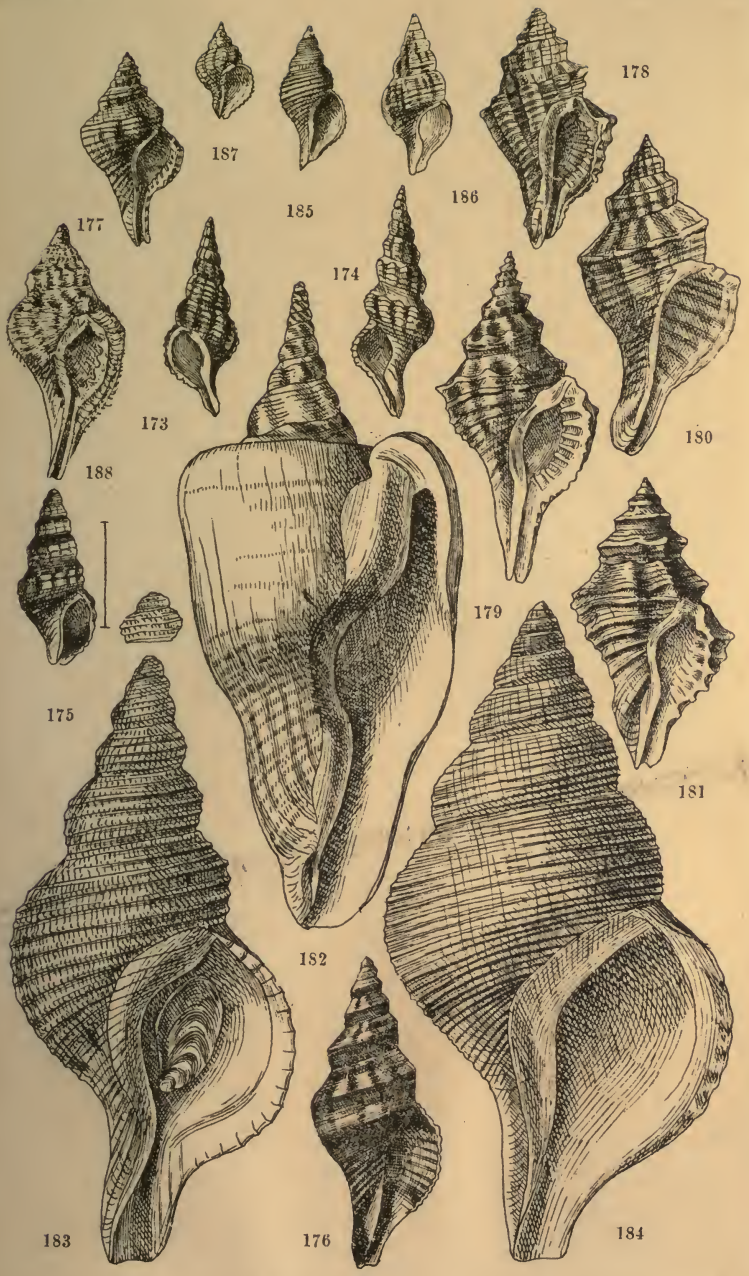
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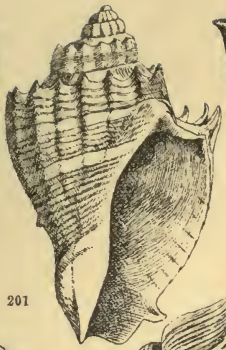

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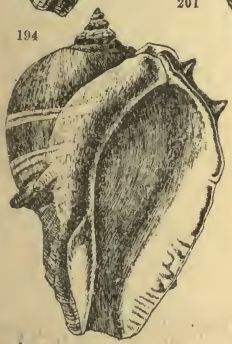

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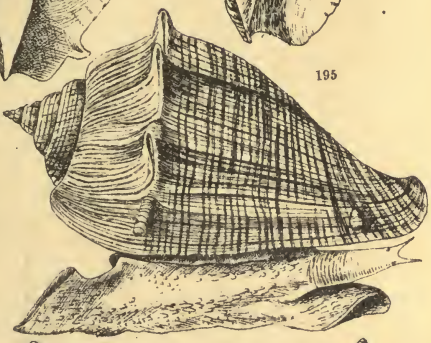

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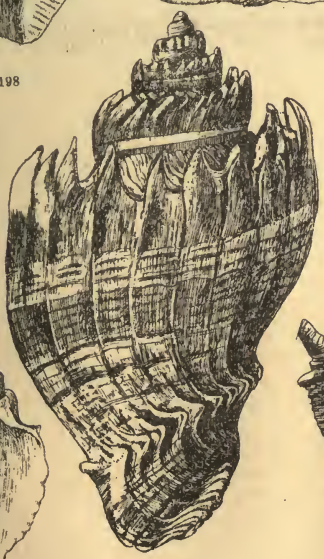

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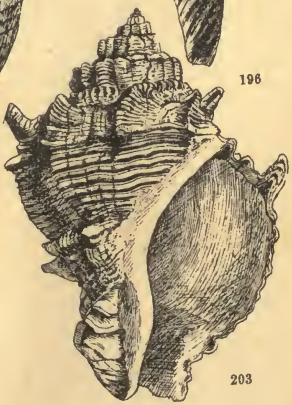

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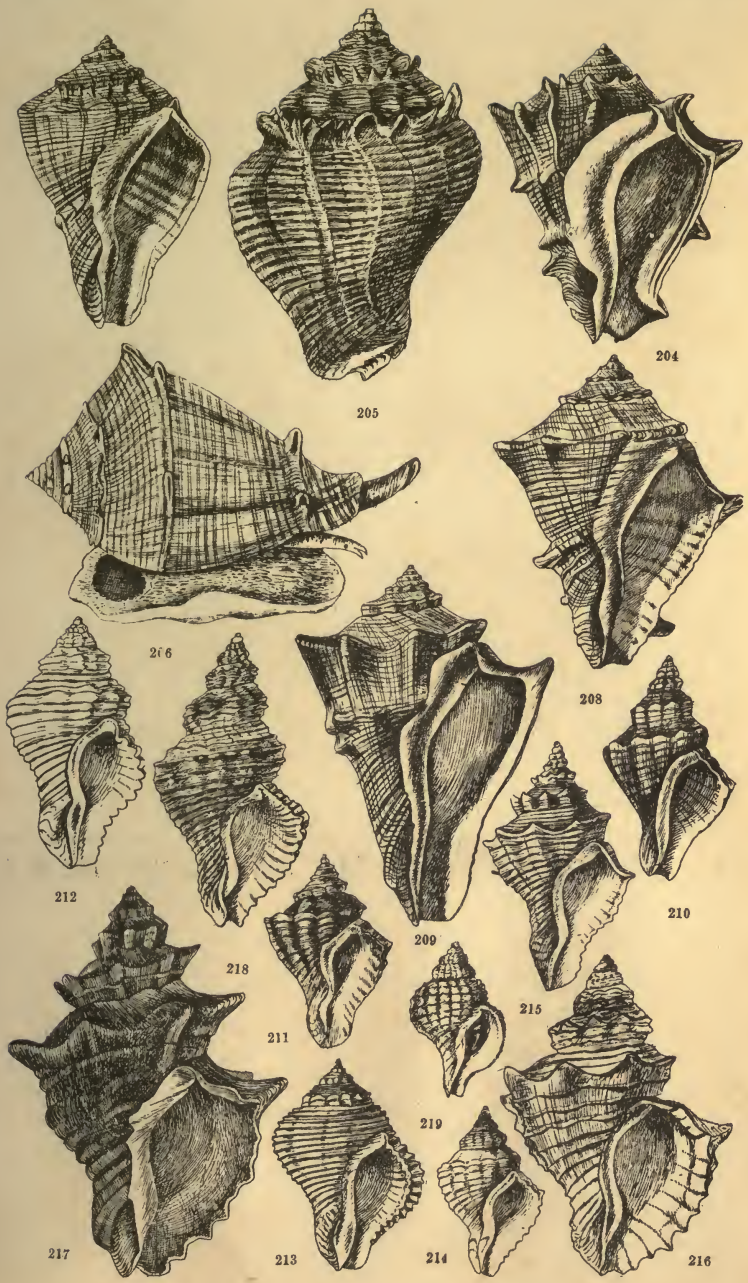
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distributed revolving grooves, with wide interspaces, of which there are thirty or forty on the last whorl; these are crossed by faint lines of growth. Aperture rounded ovate, outer lip thin, columella arcuated, polished, not thickened; canal very short and wide. Fasciole none. Length, ·9 inch.

Arctic Ocean.

The sculpture reminds one of the true *Fusus Islandicus*, which, however, has a long canal. The epidermis is not perceptible, and all the specimens were imbedded in lumps of dense spongy growth.

The above is Mr. Dall's description.

S. PRODUCTUS, Beck. Pl. 52, fig. 326.

Yellowish white under a brownish epidermis, ponderous, aperture small and narrow. Length, 41 mill.

Cape North, Siberia.

S. BENZONI, Mörch. Pl. 52, figs. 327, 328.

Thick, ponderous, white, covered with obsolete spiral liræ; epidermis thin, reddish brown. Length, 32–39 mill.

Bahia, Brazil.

I figure, besides the original in the Jour. de Conchyl., a shell (fig. 328) which Kobelt refers to the same species. The locality is probably an error.

S. PYGMÆUS, Gould. Pl. 52, fig. 330.

White, under a yellowish epidermis; animal white.
Length, 15–20 mill.

Connecticut, northward to *Newfoundland.*

Mr. Verrill has made for this species a subgenus *Neptunella*, founded on the peculiarly velvety epidermis and the dentition. The epidermis is, however, no more velvety than in some other species, and the description of the dentition given by Verrill applies very well to that of *Sipho Islandicus*.

This species is very like *S. gracilis*, except that it is much smaller.

** * Shell longitudinally plicate, decussated by revolving lirœ.*

S. KROYERI, Möller. Pl. 53, figs. 333–336, 349–351.

Greyish white under a smooth, thin, brownish epidermis.

Length, 91 mill.

Circumpolar; *Greenland; Behring's Sea; Spitzbergen; Labrador; Banks of Newfoundland.*

In addition to the typical form I figure, from Kobelt, a stout variety collected by Dall at Unalaschka. Among the synonyms are *S.* (*Bucc.*) *tortuosus*, Reeve (fig. 349), *S. arcticus*, Phil. (fig. 336), and *S. cretaceus*, Reeve (fig. 350), and, possibly, *S. scalariformis*, Beck. *S. plicatus*, A. Ad. (fig. 351), from Japan, is apparently the same species.

S. FENESTRATUS, Turton. Pl. 53, figs. 337–339.

Shell rather thin, semi-transparent; epidermis rather thin, brownish yellow, rising into numerous fine prickles on the spiral striæ. Length, 1·7 inches.

Norway; Ireland; Newfoundland; 40 to 160 fathoms.

S. LATERICEUS, Möller. Pl. 53, figs. 340–342.

Light reddish brown. Length, 25 mill.

Greenland; Norway.

S. BRUNNEUS, Dall. Pl. 53, fig. 343.

Nearly allied to the preceding, but with smaller and higher plications more plainly developed on the last whorl.

Length, 18 mill.

Behring's Sea; 10 fathoms.

S. PELLUCIDUS, Hancock. Pl. 53, fig. 344.

Yellowish horn-color, pellucid. Length, ·37 inch.

West Coast of Davis' Strait.

Only one specimen dredged, thirty-five years ago; has not since been recognized. May be a *Bela* or even a *Trophon*, but is compared by Hancock with *Fusus Islandicus*.

S. VIRENS, Dall. Pl. 53, fig. 347.

Shell small, similar to *S. brunneus* in general characters, but covered with a grass-green epidermis, tinged with light brown in some specimens. The canal is more clearly defined; aperture much shorter and rounder, ridges and grooves less prominent

and clearly defined. The costæ are more arcuated posteriorly, and the embryonic whorl larger, with revolving threads instead of being smooth. Whorls five and a-half. Costæ nine to eleven on the last whorl; ridges more numerous than in *S. brunneus*, but almost too faint to count. Length, ·65 inch.

Kyska Harbor, Alaska; 10 fathoms.

None of the specimens fully adult, but clearly different from any other described species of the region.—Dall.

S. Jessoensis, Schrenck. Pl. 53, figs. 345, 346.

Light roseate or reddish, under a light olive-green epidermis. Length, 27 mill.

Japanese Seas; 48 fathoms, sand and mud.

My figure is from the original; afterwards the same species, apparently, was described by Mr. E. A. Smith under the name of *Sipho Manchuricus*, A. Adams' MS.; and in this description the specimen is larger, attaining the above length. Some of the preceding species may be identical with it.

S. angustus, E. A. Smith.

Fusiform; whorls about ten, slightly convex, longitudinally plicated, finely spirally striated; plicæ somewhat oblique and arcuate, not particularly raised, broader than the interstices, about eighteen on the penultimate whorl; last whorl contracted and produced below into a slender, recurved beak; aperture rather less than half the entire length of the shell. Whitish, with a broad obscure brownish band round the middle of the whorls, clothed with a greenish yellow epidermis; aperture light brown within. Length 25 mill., diam. 6·5 mill.

Vancouver's Island.

Remarkable for its slender form. It is not figured, and I know nothing concerning it.

Undetermined Species of Sipho.

S. rectirostris, Carpenter. Pl. 53, fig. 348.

Puget Sound, etc.

No diagnosis of this species has been published; it is merely mentioned in Carpenter's 2d Report, and figured in Küster from a drawing furnished by W. H. Dall.

S. BREVICAUDA, Desh.

Kamtschatka.

Not figured. Said to resemble *S. lividus*, Mörch.

In Sowerby's monograph of *Fusus*, just published in the Thesaurus Conchyliorum, occur the following species, referable to *Sipho:*

S. RECTIPLICATUS, Sowb. Pl. 87, fig. 612. *Northern Seas.*

This is a form of the very variable *S. Kroyeri*, Möller.

S. OBESUS, Sowb. Pl. 87, fig. 624. *Northern Seas.*

Nearly allied to *S. glabra*, Verkrüzen, but more bulbous below. Probably not distinct from that species.

S. SOLIDULUS, Sowb. Pl. 87, fig. 622. *Northern Seas.*

= *S. Stimpsoni*, Mörch, Var., p. 126, t. 51, f. 313.

Through the courtesy of Prof. Friele, who has forwarded to me proof plates of his forthcoming work on the Mollusca of the Norwegian Polar Expedition, I am enabled to illustrate the following additional species:

S. DANIELSENI, Friele. Pl. 87, fig. 610.

Shell whitish. Length, 39 mill.

Dredged between *Norway and Greenland*, at 1000 fathoms.

Very closely related to *S. lividus*, Mörch (t. 53, f. 321), and *S. Sarsii*, Jeffreys (t. 52, f. 322, 323). I have not seen specimens of this or the succeeding species.

S. HANSENI, Friele. Pl. 87, fig. 628.

Yellowish brown. Length, 61 mill.

Spitzbergen.

Only one example found. Resembles the variety of *S. Stimpsoni*, which I have illustrated, Pl. 51, f. 313.

S. VIRGATUS, Friele. Pl. 87, fig. 613.

Reddish yellow. Length, 30 mill.

Near *Lofoten, Spitzbergen.*

In form and extraordinarily short canal, like *S. Verkrüzeni*, but sculpture and apex different.

S. DALLI, Friele. Pl. 87, fig. 625.
S. UNDULATUS, Friele. Pl. 87, fig. 626.

Not published; figured from advance plate of the Norwegian North Sea Expedition. *S. Dalli* appears to be a *S. tortuosus* with well-developed spiral sculpture (see t. 51, f. 302–305); *S. undulatus* is not adult.

NEPTUNEA OSSIANI, Friele. Pl. 87, fig. 621.

Form similar to *N. Turtoni*, with yellowish brown, somewhat scabrous epidermis. Length, 88 mill.

Near *Lofoten, Spitzbergen.*

The sculpture and epidermis, mouth and canal, are considered different from *N. Turtoni*, and the shell is less solid. Certainly very closely related.

Subgenus **Mohnia**, Friele.

M. MOHNII, Friele. Pl. 52, figs. 331, 332.

White, subpellucid, epidermis thin, smooth or slightly hispid. Length, 22 mill.

North Atlantic Ocean.

The paucispiral operculum is the distinguishing feature of this species and subgenus; and I can scarcely believe that some error has not occurred in assigning such an operculum to one of the Buccinidæ, because we are accustomed to consider this form as evidence that the shell to which it belongs is holostomate.

Genus **SIPHONALIA**, A. Adams.

This genus is principally of tropical and subtropical distribution, and more highly colored than *Neptunea:* which, nevertheless, it approaches very nearly in the form and color of *S. Kellettii*, for instance. The metropolis of the genus is Japan, a few forms being found, however, on the opposite shores of the West Coast of North America; some species occur also in Australian waters. The shells are usually thin and ventricose, variegated in color, and destitute of epidermis. The operculum is fusoid.

A number of the species have been recently described by Mr. Arthur Adams and others, the diagnoses being unaccompanied

by comparative characters or figures. The variation of coloration and sculpture is known to be great in this genus, consequently it is very probable that a portion of these species will prove to be synonymous with others previously described. I shall merely enumerate these as unidentified species.

The animal and dentition of *Siphonalia* are unknown.

S. KELLETTII, Forbes. Pl. 54, fig. 352.

Thick, ponderous, white. Length, 4–6 inches.

Lower California; California; Japan.

Kobelt justly remarks that this species occupies an intermediate position between *Siphonalia* and *Neptunea*, so that it is difficult to decide in which genus it ought to be placed.

S. FUSCOTINCTA, Cpr.

A unique, unfigured shell from Sta. Barbara, Cal. It is probably very immature, being only ·17 inch long. It is said to look like a minute edition of *S. Kellettii*, but does not accord with the young of that species. Science is not benefited by the description of such material as this.

S. FUSCOZONATA, Angas. Pl. 55, fig. 361.

White, with an interrupted, broad brown band on the periphery; lip acutely lirate within, columella with a superior callus.

Length, ·54 inch.

S. Australia.

Said to resemble *Peristernia*, but without the columellar plications of that genus. It is too small to be an adult shell, if a *Siphonalia*.

S. MODIFICATA, Reeve. Pl. 55, fig. 362.

Light yellowish brown. Length, 44 mill.

La Pas, L. California, Carpenter; *Japan*, A. Adams.

Resembles somewhat *Melongena pallida*, B. and S., and may not be properly classed as a *Siphonalia*.

S. SPADICEA, Reeve. Pl. 55, fig. 363.

Light brown, with here and there longitudinal reddish flames and reddish brown spiral ridges. Length, 42 mill.

Japan.

I do not know this species; it resembles some of the Melongenæ quite as much as this group—where it is placed by Kobelt.

S. TUBEROSA, Reeve. Pl. 54, fig. 354.

Chestnut-brown, white on the principal spiral ribs and nodules; aperture bluish white. Length, 3 inches.

Japan.

S. MAXIMA, Tryon. Pl. 54, fig. 355.

White, sprinkled and blotched with light chestnut-brown on the spiral ribs; a broad, brown band between the tubercles on the shoulder of the whorls; aperture white. Length, 7·5 inch.

Tasmania.

This shell was sent to the Philadelphia Academy by Mr. G. B. Sowerby, under the name of *Siphonalia Tasmaniensis*, Angas, and he has since figured a somewhat similar form in his "Thesaurus" as that species; *Tasmaniensis* is, however, a very different species, as will be seen by my copy of the original figure. The present species may possibly be the subject of one of the unillustrated diagnoses which I have considered it useless to attempt to identify.

S. DILATATA, Quoy. Pl. 54, figs. 356–359.

Pale yellowish brown, the revolving ridges deep chestnut; interior white. Length, 2·5–5 inches.

New Zealand; Japan, A. Adams.

F. adustus, Phil. (fig. 359) is a synonym.

Reeve and Hutton both suspect this to run into the non-shouldered *F. Mandarinus*, Duclos (= *Zelandicus*, Quoy); if this be so, all the species of *Siphonalia* might as well be given up at once. *Mandarinus* I have referred to the group *Austrofusus*.

S. CASSIDARIÆFORMIS, Reeve. Pl. 55, figs. 364–369.

Reddish orange variously banded and tinged with chocolate and white; aperture white or orange. Length, 30–55 mill.

Japan.

Quite characteristic in its general appearance, although very variable in coloring. Probably several of Mr. Arthur Adams' unfigured species are synonymous with this; Lischke thus identifies two of them, *S. ornata* and *S. conspersa*.

S. TASMANIENSIS, Ad. and Angas. Pl. 54, fig. 360.

Yellowish orange more or less fasciated with red (three bands on the last whorl), yellowish white within. Length, 60 mill.

S. Australia and *Tasmania.*

S. SIGNUM, Reeve. Pl. 55, fig. 370.

Yellowish, marbled with gray or light brown, with five or six narrow brown revolving bands. Length, 2 inches.

S. Japan.

Very like *S. Cassidariæformis* in shape, but smooth, and more produced and contorted inferiorly.

S. concinna, A. Adams, may be synonymous, as suggested by Kobelt.

S. FUSOIDES, Reeve. Pl. 55, figs. 371, 372.

Light brown, ridges profusely stained with small spots of deeper color. Length, 46 mill.

Japan.

Very like *S. Cassidariæformis*, but with longer spire, and somewhat narrower; the canal also, is a little more produced.

S. FUSCOLINEATA, Pease. Pl. 87, fig. 618.

Whitish fawn, sparingly streaked longitudinally with brown, and ornamented with sub-equidistant revolving dark brown lines. Length, 1·6 inches.

Corea, 70 fathoms.

I have not seen this species; the figure of it appears very closely related to the preceding, and it is probably synonymous with it.

S. TROCHULUS, Reeve. Pl. 55, fig. 373.

Yellowish bay-color, encircled by white raised lines; light chocolate within the aperture. Length, 40 mill.

Japan.

S. HINNULUS, Ad. and Reeve. Plate 55, fig. 374.

Whitish, strigated and maculated sparsely with orange-brown. Length, 41 mill.

Sooloo Sea; Japan, 35 fathoms.

The very short canal and smooth surface as well as the peculiar color-markings almost suggest *Eburna* rather than *Siphonalia*.

S. NODOSA, Martyn. Pl. 56, figs. 376, 377; Pl. 58, fig. 398.

Yellowish white, more or less stained with rust-red. Length, 2–2·5 inches.

New Zealand.

Purpura baccata, Hombr. et Jacq. (fig. 398), is the young of this species.

S. VARICOSA, Kiener. Pl. 54, fig. 353.

Light brown, the revolving striæ darker. Length, 2 inches.

Hab. unknown.

This species was first figured by Chemnitz, but his figures as well as Kiener's are from worn specimens. My illustration is from Reeve, and represents a very peculiar shell, the generic position of which is doubtful.

Unidentified Species of Siphonalia.

S. LIGATA, COMMODA, NODULOSA, MUNDA, FILOSA, CORRUGATA, GRISEA, COLUS, ACUMINATA, PYRAMIS, A. Adams, all from *Japan*. None of them figured.

S. ARATA, Gould. *Hab. unknown.*

S. ÆSTOSA, Gould. *Kagosima, Japan.*

S. TRAVERSI, Hutton. *Chatham Isle, New Zealand.*

S. CALCARIUS, Dunker. Pl. 55, fig. 375.

White, cretaceous. Length, 21 mill.

Japan.

Described as a *Murex:* generic position doubtful.

S. GYRATA, Hinds (Vol. II, 151, t. 33, f. 362).

This shell may be a young *Siphonalia*, although described as a *Trophon*, and included by me in the monograph of that genus.

S. CLARKEI, TURRITA, CASTANEA, PULCHRA, Woods. *Tasmania.*

Mr. W. F. Petterd* makes *Trophon Brazieri*, Woods = *S. castanea*, and considers *Siph. pulchra*, Woods, a young *Pleurotoma philomenæ*, with undeveloped lip.

Subgenus **Austrofusus**, Kobelt.

Shell ovate fusiform, whorls rounded, not angulated at the upper part.

S. ALTERNATA, Phil. Pl. 56, figs. 378, 379.

Yellowish white, the ridges deep chocolate.

Length, 2–3·25 inches.

W. Coast of Central America; Peru.

S. Fontainei, d'Orb., is from the Peruvian Coast, and appears to be a synonym (fig. 379).

* Zool. Proc., 1880.

S. SULCATA, Lam. Pl. 56, fig. 380.

Yellowish brown, with chestnut-colored revolving ridges; aperture white. Length, 4·5 inches.

S. Australia.

S. CINNAMOMEA, Reeve. Pl. 56, fig. 382.

Light reddish brown, with darker revolving ridges.
Length, 2·25 inches.

Habitat unknown.

The want of longitudinal folds appears to distinguish this species from its congeners, except *S. Mandarina*, Duclos. To this it is very closely allied and may be identical, although the revolving ridges in *cinnamomea* appear to be fewer and more distant.

S. BUXEA, Reeve. Pl. 56, fig. 381; Pl. 57, fig. 386.

Light reddish brown, obscurely light-banded, white within the aperture. Length 2·25 inches.

Cape Verd Isles.

S. Fisheriana, Petit (fig. 386), was described as a *Fasciolaria* but the want of distinct columellar folds and the sculpture seem to indicate that it would be more properly placed here; it is almost certainly equivalent to *S. buxea*, described at an earlier date, without locality.

S. REEVEANA, Petit. Pl. 56, fig. 383.

Described from a worn specimen, deprived of epidermis, supposed to come from Newfoundland. The figure appears to be badly drawn. Kobelt suspects that this will prove to be identical with *S. sulcata*, Lam. *Fusus Reeveanus*, Sowb., not Petit (t. 86, f. 600), is possibly also a *Siphonalia*.

S. MANDARINA, Duclos. Pl. 56, fig. 384; Pl. 57, fig. 385.

White or pale rust-color, ridges dark, chocolate.
Length, 2·5–3·25 inches.

New Zealand.

Fusus Zealandicus, Quoy (fig. 384), is evidently the same species; and *F. caudatus*, Quoy, is supposed to be the young shell, by Hutton, but I think it quite certain, from comparison of Quoy's figures, that *caudatus* is the young of *F. australis*. Hutton connects *S. Mandarina* with *S. dilatata*, Quoy.

S. Harfordi, Stearns.

Solid, elongate, regularly fusiform; spire elevated, whorls six or seven, moderately convex, slightly flattened (in outline) above, with a groove or channel following the suture; color chocolate-brown; surface marked by numerous narrow revolving costæ, which alternate in prominence on the body-whorl, and longitudinally by fine incremental striæ, and the upper whorls by obtusely rounded ribs of more or less prominence; aperture ovate, about half the length of the shell, polished. white and finely ribbed within; canal short, nearly straight.

Length 2·1, lat. ·94 in.

Mendocino Co. and Farallone Is., California.

Mr. Dall compares this species to *S. cinnamomea*, Reeve. It has not been figured and I have not seen it. Very rare.

Genus **FULGUR**, Montfort.

Shell with a simple, very thin periostracum, with little raised revolving lines; pyriform, with the whorls wound tightly round the axis, leaving no umbilicus, angular behind, with the upper surface shelving towards the angle; and the whorls below the angle ventricose, and thence gradually contracted and terminating in a moderately elongated canal, generally little or no longer than the aperture, concurrent with and proximal to the siphonal fasciole, and correspondingly tortuous. Siphonal fasciole coincident with the columellar plait; spire variable in evolution, with a papillary nucleus; sutures plane; aperture rhombo-ovate; outer lip in youth striated within; columella covered with a thin, callous coat, decidedly and regularly concave, and with a wide oblique marginal fold. Operculum with the nucleus apical.

Animal rather small, retractile with its operculum within the shell for about a third of a volution from the aperture.

I quote above Prof. Theodore Gill's somewhat lengthy description, forming part of his admirable synopsis of the genus; which I have adopted as a basis for this work. The distribution of the genus is restricted to the temperate and subtropical waters of the Atlantic Coast of the United States, and its manifest conchological position connects *Fasciolaria* with *Neptunea*. It is not infrequent in our miocene deposits, from which several species have been described by Mr. Conrad.

The name *Fulgur*, meaning lightning, is in allusion to the somewhat tortuous longitudinal brown streaks upon the shell, indicating rest-periods in its growth. The animal is used for bait by fishermen, and the trade in the shells for garden ornaments and for use as hanging flower-pots is so extensive as to have nearly caused the extermination of the species upon portions of the New Jersey coast.

Mörch and Adams have used the name *Busycon*, of Bolten, for this genus, but Bolten did not characterize it, whilst the later name given by Montfort accompanies a full generic description; I therefore prefer *Fulgur*. It was included by Lamarck in the heterogenous assemblage of species which he called *Pyrula*.

The late Dr. Jeffreys Wyman, in his valuable memoir on the "Fresh Water Shell Mounds of the St. John's River, Florida,"* mentions two kinds of chisel-shaped tools cut from the shells of *Fulgur carica* and *F. perversa*. These implements were probably used by the aborigines for fleshing skins and for the manufacture of articles of wood. *F. perversa* was also used by the Florida Indians as a drinking vessel, the interior whorls being removed to increase its capacity. This same species was extensively used and must have been an important article of trade among the natives, as it is frequently found in Indian graves and mounds throughout the Southern and Western States and Canada. It is probable that, among other uses it was cut up into beads and various small ornaments. The white kind of wampum or shell money of the Indians was partially made of the axis of the shells of *Fulgur*, and partially from *Buccinum undatum*.

F. CARICA, Gmelin. Pl. 57, figs. 387–390; Pl. 58, fig. 400.

Whitish, the younger specimens often marked by ash or chocolate-colored longitudinal stripes at the principal rest-periods in their growth; mouth and columella in adult specimens deep orange color. Length, 6–10 inches.

Cape Cod, Mass. to Florida. Also Miocene and Post Pliocene.

Animal large, dirty white to almost black; mantle thick, white, edge plain; proboscis long, cylindrical, slightly bi-lobed and black, or nearly so, at the end, lighter next the body; tentacles short, triangular; eyes on the outer side near the base. Opercu-

* Memoirs of the Peabody Academy, Vol. I, 1875.

lum ovate, thick, with a broad callus around the inner edge, which is heaviest on the left side; outer surface coarse and rough, greenish yellow. Mr. Conrad adopts Linnæus' name, *Aruanum*, for this species, and says that the figures in Rumphius and Gnaltieri referred to by him represent this species: the latter does, but the former is *Fusus proboscidiferus*, Lam. I am compelled on account of this uncertainty to reject the prior name given by Linnæus in favor of *carica*—under which the species is more generally known.

Var. ELICEANS, Montfort. Pl. 57, figs. 388–390.

On the coasts of Georgia and Florida occurs a variety which, commencing like a normal *carica*, eventually becomes more thickened, the spines fewer in number and more prominent, the columella white The appearance of fine specimens is perhaps sufficiently distinct to justify its separation as a different species. The ordinary manifestation of *carica* occurs in the same regions, and various transition states as well. The coloration of the rest-periods is more vivid and is retained to a much larger size in the Southern than in the Northern specimens. An exaggerated specimen of the var. *eliceans* is the shell called by Lamarck *Pyrula candelabrum* (fig. 389) in which the animal has completed the growth of the body-whorl in three growths, and consequently, has only three spines upon this whorl. The type (and only specimen known) formed part of the Lamarckian collection. *F. Kieneri*, Phil. (fig. 390), is founded on a reversed and distorted shell of var. *eliceans*. Specimens of this distorted form, uniformly from the Southern Coast, are not uncommon, and are either dextral or sinistral. Conrad has named sinistral specimens of this variety *Busycon gibbosum*. Sowerby, in his recently published monograph of *Fusus* (Thesaurus Conchyliorum) describes and figures a *F. lamellosus*, Kay (meaning De Kay, or of Gould, in his plate-explanations), said to come from the Northwest Coast of Africa. Neither of the authors cited described such a species, and the figure represents a young, but beach-worn, *F. carica*.

F. PERVERSUS, Linn. Pl. 57, figs. 391–393.

The spire is very low and the tubercles numerous and small. The shell is usually reversed, but sometimes dextral, and is

readily distinguished by the above characters and by its narrower, more elongated form, long canal, etc. The coloring is usually quite vivid in young specimens, and is frequently interrupted by the interposition of a median, broad, white, revolving band.

Length, 6–12 inches.

Florida.

Has been united with *F. carica* by several authors, and I am not nearly so certain as I once was that it is distinct; it is possibly only a variety, yet it does not seem to merge into the *carica* form. *Pyrula coarctatus*, Sowerby (fig. 393), said to occur in Florida, is this species, almost certainly.

Subgenus **Sycotypus** (Browne) Gill.

I do not consider Browne's description sufficiently characteristic to meet the requirements of a diagnosis; moreover, these shells are not even now known to inhabit Jamaica. Gill's diagnosis is, of course, accurate and exhaustive; but it mainly repeats the characters of *Fulgur;* the real difference is in the canaliculated sutures and ciliated periostracum. The distinction of "spinous" for *Busycon* or *Fulgur*, and "tuberculated" for *Sycotypus* is of little importance generically, as the Fulgurs are frequently only tuberculate when young and become spinous with advancing age; moreover, the miocene series serve to connect the two groups in this respect. Under these circumstances I judge it better to make *Sycotypus* a subgenus only, under *Fulgur*.

Mr. T. A. Conrad* attempts to distinguish the embryos of *Sycotypus* from those of *Fulgur* by the latter having a long fissure parallel with the columella, whilst the columellar region of the former is entire. Mr. Conrad's specimens, which are before me, and which I saw him extract from the pouches, certainly show this difference, but I have since had occasion to examine the embryos of *Fulgur* several times, and from different strings of pouches, *none* of which show the slit columella: the character was probably pathological.

* Am. Jour. Conch. III, 182.

F. CANALICULATUS, Linn. Pl. 57, figs. 394, 395; Pl. 58, fig. 401.

Fulvous ash-color, covered, when fresh, by a light yellowish brown pilose epidermis. Length, 5–7 inches.

Cape Cod, Mass. to Florida. Fossil, miocene to postpliocene.

The tubercles become obsolete on the body-whorl of the adult shell. Animal with white mantle, edged with a narrow, bright yellow granulous cord; proboscis long, black-tipped, reddish near the body. A string of the ovicapsules from Atlantic City, N. J., contains ninety-eight embryos in each capsule, making about five thousand for the entire string.

F. PYRUM, Dillw. Pl. 58, figs. 402, 403.

Whitish, conspicuously longitudinally flamed with light chestnut or orange; aperture whitish or yellowish within.

Length, 4–5 inches.

Florida.

Whorls carinated, but scarcely tuberculated at the angle of the shoulder. Mr. Conrad maintained that his *F. plagosus* is a distinct species, but I am not able to separate it.

Subgenus **Taphon**, H. and A. Adams.

Dr. Gill eliminates this from *Fulgur*, with which he says it evidently has no affinity. I have not seen the shell, but judging from description and figure I would suppose it to be either related to *Ficus* or to *Fulgur*, and probably much closer to *Ficus*.

F. STRIATUS, Gray. Pl. 58, fig. 404.

Whitish, streaked longitudinally with orange-brown; interior of aperture white. Length, 1·6 inches.

China.

Genus **STREPTOSIPHON**, Gill.

S. PORPHYROSTOMA, Adams and Reeve. Pl. 58, figs. 405, 406.

Whitish, with a yellow-brown epidermis, marked obsoletely with spiral brown lines; aperture white or light purple.

Length, 38 mill.

Eastern Seas, Senegal.

S. recurva, A. Adams (fig. 406) is evidently the same species.

Genus **TUDICLA**, Bolten.

Besides the typical form three additional spinose species have been described, viz., *T. armigera* and *spinosa* of Adams, and *T. inermis*, Sowb. For these H. and A. Adams have proposed a subgeneric name, *Tudicula*. Sowerby remarks that their possession of three prominent transverse plaits on the columella brings them to the family Turbinillidæ, but *T. spirillus* itself, when closely examined, shows slight traces of additional plaits besides the single prominent one, and the shells are otherwise closely related to *T. spirillus*—particularly in the long, narrow canal, and the well-defined inner lip.

T. SPIRILLUS, Linn. Pl. 58, fig. 409.

Flesh-brown, spotted and clouded with light chestnut. Length, 70 mill.

Indian Ocean.

T. CUMINGII, Jonas. Pl. 58, figs. 407, 408.

Whitish, maculated with chestnut. Length, 65 mill.

China.

T. Couderti, Petit (fig. 408), appears to me to be identical, as does also *T. fusoides*, A. Ad., an unfigured species, also from China.

T. ARMIGERA, A. Adams. Pl. 58, fig. 411.

Light yellowish brown, whitish within the aperture. Length, 2·75 inches.

Australia.

This species has not been figured by its author, but I am able to give an illustration from specimens sent to me by Mr. John Brazier, of Sydney, N. S. Wales. In possessing spines upon the canal as well as shoulder these specimens agree with the description of *T. armigera*, whilst in that of *T. spinosa* no second series of spines is mentioned: yet I suspect that the latter is not distinct, and that Mr. Sowerby's *T. inermis* is simply a depauperated specimen of the same species.

T. SPINOSA, H. and A. Adams.

An unfigured species from Australia, probably identical with *T. armigera*: See remarks under that species.

T. INERMIS, Sowb. Pl. 58, fig. 410.

White, with a broad chestnut band, and longitudinal flames of the same color; white within. Length, 1·6 inches.

Singapore?

The two specimens were obtained from a dealer at Singapore, so that the locality it inhabits is very doubtful. See remarks under *T. armigera.*

Genus **PISANIA,** Bivona.

Between typical specimens of this genus and of *Euthria* "there is a distinction with a difference," and therefore it may be profitable to retain both groups; but there are species in which the characters become so merged that their generic classification is merely arbitrary.

P. PUSIO, Linn. Pl. 71, figs. 188, 189.

Chocolate or purplish, with revolving series of red-brown arrow-headed markings, bluish within, columella and edge of lip fawn-color; usually a white central band on body.

Length, 1·5–2 inches.

West Indies; Central America.

Reeve's locality, California, is an error.

P. IGNEA, Gmel. Pl. 71, figs. 190–194.

Yellowish, spotted and flamed with reddish chestnut, and occasionally with white. Length, 1·25–1·75 inches.

Red Sea; Singapore; Philippines; Viti Islands.

The spots in this species are square instead of arrow-like as in *P. pusio:* they are frequently confluent into longitudinal flames and being interrupted on the periphery, cause it to appear as though light banded.

Var. TRITONOIDES, Reeve, Pl. 71, fig. 193.

Shell more ventricose, heavier, mottled with white on the periphery and below the sutures.

Philippines; Cape of Good Hope (Gould).

I think Gould's *Euthria lacertina* (fig. 194) is a synonym.

Var. FLAMMULATA, Hombr. et Jacq. (not Quoy). Pl. 71, fig. 192.

Shell smaller, uniform yellowish brown with a lighter central band.

The typical form is well represented by its synonyms, *P. picta*, Reeve (fig. 190), *P. flammulata*, Quoy (fig. 191), and *P. buccinulum*, Martini.

P. MOESTUM, Phil.

A small, unfigured species, the locality of which is unknown. It has revolving sulci, the intermediate spaces being articulated with white upon a dark brown ground. The description is not sufficient for positive identification with *P. pusio* or *ignea*.

P. KOSSMANNI, Pagenstecher. Pl. 71, fig. 196.

Described from a distorted specimen which is said to resemble *P. pusio*, but shows within the aperture eight brown revolving bands. Length, 30 mill.

Red Sea.

A doubtful species.

P. FASCICULATA, Reeve. Pl. 71, figs. 195, 197.

Orange-yellow, the narrow revolving riblets chestnut-color dotted with white. Length, 1·25–1·5 inches.

Philippines.

P. crenilabrum, A. Adams, described in error as from the West Indies, is apparently a mere color variation of this species; it is found at New Caledonia, and probably equals *P. Montrouzieri*, Crosse, the latter name having priority. If my surmise prove correct, the latter may be distinguished as

Var. MONTROUZIERI, Crosse. Pl. 71, fig. 197.

Color purple-brown, with darker revolving riblets, sometimes obsolete; an obscure white, irregular band on the periphery, riblets sometimes white spotted.

New Caledonia.

P. STRIGATA, Pease. Pl. 71, fig. 198.

Orange or light brown, mottled and spotted with white, incised revolving lines darker; upper whorls granular; aperture white. Length, 37 mill.

Insl. Ponape.

P. HERMANNSENI, A. Adams. Pl. 71, fig. 199.

Smooth, fulvous, obscurely punctate with white; body-whorl sulcated below. Length, 1·5 inches.

China.

P. GRACILIS, Koch. Pl. 71, fig. 200.

Light yellowish brown; whorls cingulately sulcate, the upper portions lightly crossed by longitudinal folds or ribs.

Length ·7 inch.

Hab. unknown.

Probably a young shell; generic characters doubtful.

P. RETICULATA, A. Adams. Pl. 71, fig. 201.

Light yellowish brown, sometimes marbled with reddish brown; surface closely reticulated by longitudinal and revolving fine lines.

Length, 1·25 inches.

New Caledonia; Tasmania.

Var. TASMANICA, Tenison-Woods.

Smaller; white, with irregular varices.

Mr. Woods says that the type is common in Tasmania. I give an illustration from a specimen received from that locality. Mr. Adams has not published a figure of his species.

P. MARMORATA, Reeve. Pl. 71, figs. 202, 203.

Granulated by the intersection of obsolete longitudinal and revolving ribs; polished; white with spots and clouds of light chestnut. Length, 1–1·5 inches.

Philippines; Sandwich Isles; Japan (Schrenck).

Var. BILLEHEUSTI, Petit. Fig. 203.

This is narrower than the type but does not seem to differ. Petit naïvely says of it: "Si quelqu'un nous disait que notre espèce est le *Bucc. marmoratum* décrit par M. Reeve, nous n'oserions, en vérité affirmer le contraire."

The variety is found at New Caledonia, and Viti Isles. The form of this species is that of *Pisania*, but its sculpture is more like *Cantharus*, and it might be placed in the latter genus with perfect propriety.

P. CINIS, Reeve. Pl. 71, fig. 204.

Reddish white, the granules chocolate-color. Length, 1 inch.

Galapagos Is., (under stones).

Reeve says, "The granules of this shell impart a rough touch to it, resembling that of a coal cinder." I think it very probably identical with *P. marmorata*.

P. Pazi, Crosse. Pl. 71, fig. 205.

Brownish black; livid within the aperture; lip margin and columella tinted with yellowish brown. Length, 40 mill.

Hab. unknown.

This species also, as well as *P. cinis*, Reeve, may be a form of *P. marmorata*, Reeve.

P. maculosa, Lam. Pl. 71, figs. 206–209.

Olive-brown, yellowish white or light purple, profusely streaked and spotted with chestnut-brown, with frequently a light central band; interior brownish or chocolate, showing the white band. Sometimes dark chocolate, with numerous white spots and band. Length, ·75 to 1·25 inches.

Mediterranean (littoral), *Azores; St. Croix, W. I.?*

Fossil in several parts of Southern Europe.

This species is known to many European naturalists under the name of *P. pusio*, Linn., but the type of *pusio* is a very different shell, being the West Indian *P. plumata*, Gmel. = *articulata*, Lam. Gmelin has called it *striata*, and his name has priority over *maculosa*, but the latter is so well known that I will not displace it. Specimens in the collection of the Philadelphia Academy are labelled "St. Croix, W. I., R. E. Griffith," but the species has not been otherwise reported from the West Indies. *Buc. Æthiops*, Phil. (fig. 209), is evidently a very dark, immature *maculosa*.

P. Janeirense, Phil. Pl. 71, fig. 210.

Fusiform, solid, transversely obsoletely lirate; dark brown, longitudinally flecked with white, with a brown articulated white revolving band. Length, 1·5 inch.

Rio Janeiro, Brazil.

The greater size and solidity are the chief distinctive features; it is very likely only a finely grown *P. maculosa*, Lam.

P. cingulata, Reeve. Pl. 71, figs. 211, 212.

Yellowish brown, with narrow chestnut revolving threads, which are frequently interrupted, causing the coloring to appear as revolving rows of spots; light chocolate within the aperture, ridged. Length, 1 to 1·25 inches.

Loo Choo Is.

Reeve described this peculiar, thick shell without locality, and at first I was disposed to regard it as a variety of *Euthria lineata*,

Martyn, but the heavy appearance and great general similitude to *P. maculosa*, ascertained by the examination of specimens collected by Dr. Wm. Stimpson, of the U. S. N. Pacific Expl. Exped., show that its proper place is next after the common European species. *Buccinum guttatum*, Phil., an unfigured species from Java (?), appears from the description to be very similar to *P. cingulata.*

P. CINGILLA, Reeve. Pl. 71, fig. 213.

Covered with fine revolving grooves; reddish chestnut, with a central white band. Length, 22 mill.

Hab. unknown.

P. GUTTATA, Busch. Pl. 71, fig. 214.

Reddish brown, with white or yellowish blotches and angular markings. Length, 1·1 inch.

Hab. unknown.

Looks very much like a *Columbella.*

P. SOLOMONENSIS, E. A. Smith. Pl. 71, fig. 217.

Granular; whitish, with two, more or less interrupted brown bands. Length, 8 mill.

Solomon's Is.

P. GLIRINA, Blainv. Pl. 71, figs. 215, 216.

Violet-grey, maculated longitudinally with reddish brown; columella yellowish, aperture grey. Length, ·75 inch.

Australia? Island of Tonga-Tabou?

Kiener, Küster and Reeve figure this as *discolor*, Quoy, but the latter is a very different shell and belongs to the Purpurinæ.

Indeterminate Pisaniæ.

P. MOLLIS, Gould. *Simoda, Japan.*
P. FILARIS, A. Adams. *China.*
P. LUCTUOSA, Tapparone-Canefri. *Mauritius.*

Neither of the above have been figured.

Genus **EUTHRIA**, Gray.

E. CORNEA, Linn. Pl. 72, figs. 218, 219.

Yellowish white, reddish or purplish, variously painted with brown; interior of aperture purple-brown.

Length 1·75 to 2·5 inches.

Mediterranean, 5 to 15 fathoms

Fossil; miocene and pliocene of Southern Europe.

E. ARACANENSIS, Angas. Pl. 72, fig. 220.

Pale olivaceous brown, with longitudinal irregular, chestnut markings; aperture pale flesh-color. Length, 2 inches.

Aracan.

Appears very like a *Siphonalia*, and is the most ponderous species of the genus.

E. PLUMBEA, Phil. Pl. 72, figs. 221–226.

Smooth, or upper whorls slightly costate in fresh specimens; ashy brown, sometimes light chocolate.

Length, 1·25 to 1·5 inches.

Cape Horn to Chili; Japan.

Var. FERREA, Reeve. Pl. 72, fig. 223.

Spirally lineated with brown.

Japan.

E. ferrea, Reeve, and *E. viridula*, Dunker (fig. 225), from Japan, are doubtless the same as *E. plumbea*, notwithstanding the great difference of locality: that of *plumbea* being undoubtedly as quoted. As to the identity of *ferrea* and *plumbea*, P. P. Carpenter and A. Adams, admit it, whilst E. A. Smith makes *viridula* = *ferrea*. To these synonyms I add *Fusus rufus*, Hombr. et Jacq. (fig. 222) *Buccinum Magellanicum*, Phil. (fig. 224), and *B. Patagonicum*, Phil. (fig. 226), from Cape Horn.

E. SIMONIANA, Petit. Pl. 72, fig. 227

Whitish (stained greenish) with reddish brown flames, spirally lirate, liræ plano-convex; brownish within the aperture.

Length, 48 mill.

Cape of Good Hope.

The color is difficult to ascertain, says M. Petit, on account of a stain resulting from the waters where it lives.

E. ANTARCTICA, Reeve. Pl. 72, fig. 228.

Whorls strongly plicately ribbed towards the apex, ribs of the last whorl fading away; epidermis thick, olive; interior purple-brown, columella and inner edge of lip white. Length, 1·3 inch.

Falkland Islands.

Its pertinence to this genus, where it is placed by H. and A. Adams, is doubtful.

E. LINEATA, Martyn. Pl. 72, figs. 229–231.

Yellowish white regularly lineated with chestnut revolving bands, which are sometimes raised into low ridges; pink or purplish within the aperture. Length, 1·25 to 2 inches.

New Zealand.

A broader species than *E. plumbea*, Var. *ferrea*, but the young shells of this species are very like the latter.

Var. PERTINAX, Martens. Shell more ventricose, longitudinal costæ of the spire extending over the antepenultimate whorl; color bands less numerous. Length, 68 mill.

Auckland Islands.

This variety has not been figured.

Var. LITTORINOIDES, Reeve. Pl. 72, fig. 231.

Smaller, more ponderous, canal shorter. The type figured by Reeve (fig. 229), is a very different-looking shell, but I have a specimen before me which seems to connect it with *lineata*.

New Zealand.

E. MARTENSIANA, Hutton.

Smaller than *Littorinoides*, much thinner, spiral whorls more distinctly costulate. Length, ·7 inch.

New Zealand.

Not figured. Will very probably prove to be a synonym of the above species.

E. DIRA, Reeve. Pl. 72, figs. 232, 233.

Upper whorls longitudinally plicate, plicæ becoming evanescent on the body-whorl; whole surface deeply engraved with narrow revolving channels, making the interstices appear as though covered with revolving, flat-top ribs; sometimes these ribs are divided by an impressed line into pairs. Grayish brown, revolving ribs darker; aperture yellowish brown, ribbed within and stained darker in the interstices at the lip.

Length, 1·25–1·75 inches.

Monterey, Cal., to Sitka.

F. Sitchensis, Midd., and *F. incisus*, Gld. (fig. 233), are synonyms; the figure of the latter is, however, not very characteristic of the species, being too much inflated and with the canal not sufficiently produced.

E. BICINCTA, Hutton. Pl. 72, fig. 234.

Smooth, white, porcellanous, with two chestnut bands on the body-whorl and one on the spiral whorls. Length, 1·1 inches.

Chatham and Auckland Isles.

E. VITTATA, Quoy. Pl. 72, figs. 235, 236.

Yellowish, with two brown bands on the body, and one on the spire; bands made up of three approximate lines.

Length, ·75 inch.

New Zealand.

A smaller, heavier species than the preceding; lip thickened and dentate within, canal more produced. *E. trilineata*, Reeve (fig. 236), appears to be the same.

Undetermined Species.

E. CHLOROTICA, Martens. *Kerguelen's Isl.*
E. FUSCOLABIATA, E. A. Smith. *Japan.*
E. BADIA and LIRATA, A. Adams. *Japan.*

E. FUSCATA, Brug. Pl. 72, fig. 237.

Reddish brown, brown within the aperture. Length, 31 mill.

Coast of Peru, abundant.

I am not able to assign this species to any genus with certainty; it was described as a *Buccinum*, which of course it is not.

Genus **METULA**, H. and A. Adams.

Only four species have been described: they are deep-water shells, conchologically closely related to *Pisania*, etc., but with finely cancellated surface. The dentition resembles somewhat that of the Turbinellidæ.

M. CLATHRATA, Adams and Reeve. Pl. 72, fig. 238.

Brownish white, obscurely two or three fasciate.

Length, 27 mill.

Cape of Good Hope; 136 fathoms.

M. MITRELLA, Adams and Reeve. Pl. 72, fig. 239.

White, obscurely marked with four subquadrate dark maculations. Length, 23 mill.

China Seas; from ten fathoms.

M. Cumingii, A. Adams. Pl. 72, fig. 241.

Yellowish brown, tinged with chestnut. The cancellation in the specimen described, which appears to be an old one, is confined to the upper part of the spire. Length, 37 mill.

West Coast of Africa.

M. Hindsii, H. and A. Adams. Pl. 72, fig. 240.

White, with four revolving series of brownish maculations. Length, 17 mill.

West Coast of Veragua; in mud, at a few fathoms' depth.

Doubtful Species.

M. bella, C. B. Ad.

White, with reddish brown spots in spiral series, mostly in three series, one above and two next below the middle of the whorls; with ten rather narrow prominent ribs, and spiral raised lines, nodulous at their intersection. Rather elongate, with seven very convex whorls, a long ovate aperture, and a wide, moderately lengthened canal. Length ·44 inch, diameter ·21 inch.

A single specimen only obtained. This was subsequently examined by P. P. Carpenter and said by him to resemble a young *Metula:* I am inclined to think it more likely a *Columbella.* In his Mazatlan Catalogue, Carpenter enumerates four doubtful Metulæ, to which he does not give specific names. It is not at all probable that they belong to the genus.

Genus **CANTHARUS**, Bolten.

Swainson described a group *Tritonidea* which Messrs. H. and A. Adams make a subgenus under *Cantharus*, distinguishing it from the typical form by "Shell turreted; canal lengthened." The distinction is altogether arbitrary, as the spire in the different species varies considerably from the typical species of *Cantharus* to much higher, but with no considerable break in the series, whilst the canal can scarcely be called "lengthened" in any of them. I have suppressed the subgenus as superfluous and confusing.

C. SPIRALIS, Gray. Pl. 73, figs. 242, 243.

White, more or less marbled with reddish brown; covered by a dark brown, sparsely pilose epidermis. Length, 1·5 inches.

Mauritius.

Buccinum Prevostii, Val. (fig. 243), is evidently a synonym.

C. TRANQUEBARICUS, Gmel. Pl. 73, fig. 244.

White, or with the revolving ridges sometimes reddish, under a thin, light brown epidermis; margin of aperture sometimes tinged with orange. Length, 1·5 inches.

Tranquebar.

The shoulder of the whorls is more convex, the longitudinal ribs are more numerous and narrower and extend over the spiral whorls, where they are obsolete in *C. spiralis:* the revolving lines which take the place of the more sharply defined and less numerous revolving ribs and sulci of *spiralis* will also serve to distinguish the two species.

C. MELANOSTOMA, Sowb. Pl. 73, fig. 245.

Orange-brown, usually interruptedly stained with darker color on the longitudinal ribs. Aperture white, with an orange-brown lip and chocolate columella. Length, 1·5–2·25 inches.

Ceylon.

This species was confounded by Kiener and others with *C. Tranquebaricus*, from which it differs not only in its greater size and solidity, and in coloration, but in its wider, cord-like revolving ribs and more apparent shoulder.

C. IOSTOMA, Gray.

Shell ovate, solid, dark brown, closely spirally striated, slightly longitudinally plaited, covered with a thin, hairy periostracum; spire short conical; last whorl subangular and nodulose behind. Mouth ovate, large, black; throat purple, grooved; outer lip crenulated; inner lip rather expanded, and strongly veined.

Length, 1·5 inches.

Pacific Ocean.

The above is the original description: the species has not been figured nor recognized by subsequent authorities. It has some affinity with *melanostoma*, and may possibly be a form of that species.

C. ERYTHROSTOMA, Reeve. Pl. 73, fig. 246.

Yellowish brown, the ribs stained with chestnut or chocolate; margin of aperture and columella orange or red.

Length, 1·25 to 1·5 inches.

Ceylon; Japan.

The more rounded whorls, deeper sutures and slighter substance, as well as the coloration, distinguish this from the following species. *C. fumosus* sometimes has a yellowish lip also, but generally, on good specimens, there is a light revolving band, which is barely indicated upon *erythrostoma*.

C. FUMOSUS, Dillw. Pl. 73, figs. 247–255.

Yellowish orange or light brown, the longitudinal ribs chestnut or chocolate, usually a revolving white band below the periphery; lip and columella sometimes stained with yellow.

Length, 1 to 1·25 inches.

Red Sea; Ceylon; Singapore; Philippines; Japan; Australia; Polynesia.

Buccinum strigosum, Gmelin has priority, but the name is not adopted because he included two species in his description. The principal recent synonyms are *C. Proteus*, Reeve (figs. 247–249) and *C. undosus*, Kiener and Quoy (not Linn., fig. 250).

Var. RUBIGINOSUS, Reeve. Pl. 73, fig. 251.

This is a narrower form, with more elate spire; orange brown, white banded, usually not darker on the ribs. Its metropolis is the Red Sea, whence it extends throughout the Indian Ocean into Polynesia, merging into the typical *fumosus*. One of these slight variations has been called *C. subrubiginosus*, by Mr. E. A. Smith (fig. 252), and comes from Japan. The specimen figured is not fully adult. Other species, founded on the narrow variety are *C. biliratus*, Reeve (fig. 253), from Galapagos and Viti Islands, and *C. nigricostatus*, Reeve (fig. 254), said to come from Panama, which I doubt. *Pisania Desmoulinsi*, Montrouzier (fig. 255), from New Caledonia, is synonymous also.

C. CARINIFERUS, Küster. Pl. 73, fig. 256.

Described by Krauss as *C. rubiginosus*, from which it differs in the ribs being obsolete and the spiral striæ well developed on the body-whorl. Martens and Kobelt have placed it in *Comi-*

nella, the former as synonymous with *C. porcata*, the latter as a distinct species; but the want of a superior depression on the whorls and the possession of tubercles near the base of the columella show that Krauss was right in comparing it with *C. rubiginosus*, although it may not be identical with that species. It is chestnut-brown, with a white band.

South Africa.

C. LIMBATUS, Phil. Pl. 73, fig. 257.

White, marbled with orange. Longitudinal ribs fourteen, revolving striæ eight; lip with an external varix. Length, 10 mill.

West Indies.

I know nothing of this minute species; it is a very doubtful one.

C. EXTENSUS, Dunker. Pl. 73, fig. 258.

Yellowish brown, generally with two white revolving bands on the body-whorl. Length, 15 mill.

Java.

Looks very much like a minute edition of *fumosus* var. *rubiginosus*.

C. BOLIVIANUS, Souleyet. Pl. 73, fig. 259.

Yellowish brown, not banded. Length, 7 mill.

Cobija; Bolivia.

Evidently allied to the above.

C. CAPENSIS, Dunker. Pl. 73, fig. 260.

Dirty yellow, variegated with brown. Length, 22 mill.

Cape of Good Hope.

Among eight specimens, two had white bands. The specimen figured is evidently not adult. I cannot, for want of material, decide upon its position, but think it will prove to be synonymous with *C. fumosus*. Kobelt's figure of this species is incorrect, and represents *Pisania lacertina*, Gould

C. RUBENS, Küster. Pl. 73, fig. 261.

Dull orange-brown, white within. Surface cancellated by close longitudinal and revolving ribs. Length, 22 mill.

Red Sea.

The smaller size, and more numerous ribs are relied upon as distinguishing features from *C. fumosus* var. *rubiginosus*, but I think it may prove to be a stunted variety of that species. Prof.

Mörch has labelled specimens in our collection "*C. rubiginosus.*" The longitudinal ribs are sixteen to eighteen in number.

C. MENKEANUS, Dunker. Pl. 73, fig. 264.

Ribs yellowish brown on a white surface, eleven to fifteen in number; a white band on the middle of the body-whorl.

Length, ·5 to ·6 inch.

Japan.

A. Adams (Ann. Mag. V, 1870), identifies with this *Engina concinna*, Reeve, but Lischke (Moll. Jap. Suppl. 50), points out the great difference between the two shells. The illustration which I copy, is either a very poor one, or it is taken from a worn specimen. I conjecture that it will be found to differ not much from *C. fumosus* var. *rubiginosus.*

C. CECILLII, Phil. Pl. 73, figs. 262, 263.

Longitudinal ribs six in number, which become true varices on the body-whorl; yellowish to chestnut brown, the revolving striæ darker, frequently a white band below the periphery.

Length, 28 to 38 mill.

China; Japan; Torres Straits.

Turbinella Cecillii has not been figured, but the description is unmistakable and has priority over *Buccinum ligneum*, Reeve (fig. 262), *B. balteatum*, Reeve (fig. 263), and *B. Cumingianum*, Dunker. Philippi described the species as a doubtful *Turbinella* on account of the tubercles at the base of the columella, which are transverse and oblique, somewhat resembling the plaits in that genus. Frequently, the ribs become true varices on the body-whorl, which, with their smaller number and greater size will distinguish them from *C. erythrostoma.*

C. FUSULUS, Brocchi. Pl. 73, fig. 265.

This mollusk, described seventy years ago as a fossil species, has recently been found living in the Mediterranean Sea. I have not seen it and have not access to the paper by Libassi, in which, under the name of *Spadæ*, it is redescribed and figured. My illustration is from Brocchi, and apparently resembles a *Murex* rather than a *Cantharus.*

C. D'ORBIGNYI, Payr. Pl. 73, figs. 266, 267.

Yellowish to chocolate, with a median white band; aperture usually white, sometimes light violet. Length, 15–20 mill.

Mediterranean; littoral, upon rocks.

Var. ASSIMILIS, Reeve. Pl. 73, fig. 267.

Senegal; Algiers, etc.

C. SCABRA, Monts.

This name is proposed by Monterosato, without description or figure for a shell which he previously designated as *C. d'Orbignyi*, var. *subspinosa*—likewise without diagnosis. I do not know the species.

C. LEUCOZONA, Phil. Pl. 74, fig. 270; Pl. 73, fig. 268.

Purple or chestnut-brown, with a white band on the angle of the shoulder. Length, 20 mill.

Mediterranean.

Fusus violaceus, Desh. (fig. 268), is doubtfully referred to this species by Weinkauff.

C. PICTUS, Scacchi. Pl. 74, fig. 271.

Yellowish white, interruptedly marbled with chestnut-brown. Length, 8–10 mill.

Mediterranean, from Sicily to Greece.

C. HOMOLEUCA, Küster. Pl. 74, fig. 272.

Dirty white. Length, 12 mill.

Mediterranean.

Described from a single specimen, which is probably beach-worn, and so has lost its color. The locality is not certain. It may be the same as *C. pictus*, or perhaps *C. d'Orbignyi*, var. *assimilis*.

C. PERLATUS, Küster. Pl. 74, fig. 273.

Yellowish white, the nodules purple-brown; with a white band. Length, 8 mill.

Natal Coast, S. Africa.

Compared by Küster with *C. pictus*. It looks as much like a *Columbella* as a *Cantharus*.

C. LUGUBRIS, C. B. Ad.

Long ovate-fusiform; very dark brown, with a cinereous tinge; with small ribs, from nine to thirteen on each whorl, traversed

by rather coarse, unequal, spiral striæ, with the intersections of the larger striæ rather acutely nodulous; apex acute; spire conic; whorls eight, very convex, with a moderately impressed suture; aperture ovate; labrum rather sharp, thickened behind; with a short, recurved canal. Length, ·67 inch.

Panama and Taboga; under stones at low water.

I am not acquainted with this species.

C. ELATA, P. P. Carpenter.

Shell elate, white, strigate or maculate with reddish brown; whorls more than six, convex, with impressed sutures; longitudinal ribs six to eight, crossed by alternately larger and smaller revolving lirulæ; canal narrow, subrecurved; aperture subovate, dentate within. Length, ·68 inch.

Cape St. Lucas, L. California.

The description indicates imperfect specimens. I have before me a shell received from the Smithsonian Institution as from Cape St. Lucas, and identified by Carpenter as *C. lugubris*, C. B. Ad. This shell corresponds so well with the above description that I suppose it to be the same; but it is in too imperfect condition to figure advantageously.

C. PUNCTICULATUS, Dunker.

Shell small, ovately acute, more or less graceful, subfusiform, transversely lirate, liræ crowded, longitudinally costate, costæ granose. Whitish or yellowish, the nodules obscurely fuscous. Length, 10–15 mill.

Red Sea.

I am not acquainted with this species Mr. Tapparone-Canefri suspects that *Buccinum seriale*, Deshayes, will prove to be identical with it, in which case the latter name will have priority. It is said to resemble *Buc. Scacchianum* (= *pictus*, Scacchi).

C. PAPUANUS, Tapparone-Canefri.

Small, ovate-fusiform, attenuate above and below, graceful. Color white and light brown, with darker spots upon the spiral lines. Spire subturretted, apex smooth. Whorls eight, more or less angulate above, the three upper ones smooth, the rest spirally lirate and obscurely longitudinally costate; liræ in last whorl unequal, with granular, oblong, varicolored costæ. Aperture

oblong-ovate, lip thickened within, obsoletely plicate at margin, columella smooth, canal rather long, reflected.

Length, 9–10 mill.

Papuan Is.

Not figured. Said to be distinguished from *C. punctículatus* by the smaller size, the smaller number and greater size of the spiral liræ and costæ and by the angular whorls of the spire.

C. LANCEOLATUS, Koch. Pl 74, fig. 274.

Yellowish, white banded. Length, 13 mill.

Hab. unknown.

A shell of doubtful generic position, described as a *Fusus*, but which Philippi remarks, might as well be referred to *Murex*, *Purpura* or *Pyrula*, the animal and operculum being unknown.

C. FILARIS, Garrett.

Shell solid, elongate, slenderly fusiform, light brownish, with whitish mottlings and spirally lineated with deeper brown; whorls seven, convex, longitudinally and spirally ridged; ridges small, granulated at their points of intersection; the transverse ones alternately larger and smaller; base contracted and produced into a short, slightly-twisted canal; aperture oblong, ovate, tawny yellow and lirate within; columella with several small nodules.

Length, 16 mill.

Samoa and Viti Isles; very rare, under stones on reefs.

Unfigured.

C. GRACILIS, Reeve. Pl. 74, fig. 275.

Whorls a little granulated in the middle, crossed by longitudinal and transverse obtuse, granose ridges. Whitish, longitudinal rows of granules orange-brown. Length, 1·25 inches.

Isl. of Masbate, Philippines; under stones at low water.

I suspect that this and the following species are really identical. Their generic position is somewhat doubtful; they might as well, I think, be ranged with *P. marmorata*, Reeve, in the genus *Pisania*. I have before me some shells collected by Mr. Garrett at the Viti Islands which may possibly belong to this species.

C. CROCATUS, Reeve. Pl. 74, fig. 276.

Longitudinally very closely plicated, transversely granosely ridged. Saffron-orange, speckled here and there with white; striæ between the ridges of a darker orange-brown.

Length, 27 mill.

Isl. of Capul, Philippines.

C. OBLIQUECOSTATUS, Reeve. Pl. 74, figs. 277, 278.

Longitudinally obliquely and very closely ribbed, ribs crossed with small ridges. Brown-red, transverse ridges whitish.

Isle of Ticao, Philippines.

C. CROSSEANUS, Souverbie.

Fusiform, rough, longitudinally costate, cut into transverse oblong granules by transverse sulci; whorls eight to ten, subcarinated, convex, suture well marked. White, tinged with light chestnut; body-whorl with a fulvous, median band; bluish white within the aperture. Length, 13–20 mill.

New Caledonia.

Described originally as Var. *Artensis* of *Pisania Billeheustii*, Petit (=*marmorata*, Reeve), this species occupies an anomalous generic position: it has not been figured.

C. ASPERA, Dunker.

Oblong fusiform, with six or seven slightly convex whorls, longitudinally densely plicate, crossed by roughly granose revolving ridges; white variegated with brown. Length, 12 mill.

Upolu.

This species is compared with *Pisania marmorata*, Reeve, but differs in its much smaller size, rougher sculpture, thicker longitudinal ribs, suture not incised, canal much shorter, varicose labrum, etc. It has not been figured.

C. SAMOENSIS, Dunker.

Ovate, subturreted, cancellated by thick longitudinal plicæ and revolving small ribs. White, unicolored or with interrupted fuscous revolving lines, under a pallid corneous epidermis. Whorls convex, with distinct suture, the last but little longer than the spire; canal deep, widely open. Length 14, lat. 7 mill.

Samoan Isles.

Not figured.

C. AUSTRALIS, Pease. Pl. 73, fig. 269.

Dark purplish or reddish brown, encircled by an irregular broad whitish band, or irregularly spotted, grooves reddish. Length, 14, diam., 6 mill.

New South Wales, Australia.

If *C. unicolor*, Angas, prove to be the same species, it will have priority over Pease's name.

C. UNICOLOR, Angas. Pl. 74, fig. 279.

Pale brown or whitish throughout. Length, 12, diam., 4 mill.

Port Jackson, Australia; under stones at very low spring tides.

C. PETTERDI, Brazier.

Shell fusiform, thick, longitudinally flatly ribbed and transversely ridged, the interstices filled with rows of muricated scales (only seen under the lens), whitish, ornamented with a pure white band in the centre of the whorls, and a faint brown one below; spire moderately elevated, apex blunt; whorls six, almost flat, suture impressed; aperture ovate; canal short, slightly recurved; columella arched; outer lip crenulated, thickened externally, strongly denticulated within. Length, 12, diam., 4 mill.

North-East Coast of Tasmania.

Mr. Brazier has only seen one specimen of this species, which is in the cabinet of Mr. W. F. Petterd.

C. UNDOSUS, Linn. Pl. 74, figs. 280–282.

Yellowish white, the revolving ridges chestnut- or chocolate-brown; aperture white, the columella and margin of lip tinted with yellow. Length, 1·25 to 1·5 inches.

Malacca; Australia; Philippines; Viti and Paumotus Is.

Epidermis olive, short pilose. Occasionally the shell has a few large, rounded, longitudinal ribs.

C. GEMMATUS, Reeve. Pl. 74, fig. 283.

Rusty brown, blotched with white, under an olive epidermis. Revolving ridges broken up into chocolate-colored tubercles upon the longitudinal ribs. Aperture white.

Length, 1·25 to 1·5 inches.

Monte Christi, W. Columbia (in clefts of the rocks); *Mazatlan.*

The interrupted revolving lines, more numerous ribs, higher spire and less distinctly marked shoulder will serve to distinguish this species from *C. undosus.*

C. CANCELLARIA, Conrad. Pl. 74, figs. 284, 285.

Fusiform, with longitudinal plicæ, and more elevated, distant, undulated, revolving costæ, and intermediate fine lines; whorls longitudinally rugose; aperture half as long as the shell; labrum with distant, acute, prominent lines within; columella distinctly plaited at base; beak recurved; color cinereous.

Length, 20 to 30 mill.

Ship Island, Gulf of Mexico; Cedar Key, Fla. (Calkins).

Fusus Floridanus, Petit (fig. 285), is undoubtedly a synonym of this species. Neither of the figures nor the specimens before me are adult, and the shell is so close to *C. gemmatus*, as to suggest identity; the sole distinctive characters being a more elevated spire, and more convex whorls.

C. TINCTA, Conrad. Pl. 74, fig. 286.

Irregularly variegated with chocolate- and chestnut-brown and white; margin of lip frequently tinted with orange-brown. Longitudinal ribs rather small, close, irregular or evanescent; revolving ridges sometimes broken up into tubercles where they cross the ribs; spire conical, its whorls flattened.

Length, 1 to 1·5 inches.

Florida; West Indies.

The ribs are more numerous, but not so large nor so markedly tuberculate as in *C. Coromandelianus*, the latter possessing much ruder sculpture and a decided shoulder on the body-whorl.

C. COROMANDELIANUS, Lam. Pl. 74, figs. 287–290.

Chestnut-brown and white, variegated, under a thin, rather smooth, dark olive epidermis. Length, ·75 to 1·25 inches.

Panama to Mazatlan, on rocks at low water; *West Indies*; *Brazil; Coromandel?*

A very robust, wide species, rudely, prominently sculptured, with very decided shoulder and produced posterior sinus. I cannot detect any difference between the typical W. Indian (and Coromandel?) form and *C. ringens* (fig. 288), from the West coast of North America. *C. pastinaca*, Reeve (fig. 289), from the Bay of Montija, W. Columbia, is probably a variety only.

Var. LAUTUS, Reeve. Pl. 74, fig. 290.

Differs from the type in coloration, the prevailing arrangement being chestnut variegated with white on the nodules, with a white band on the periphery; sometimes the shoulder and base of the shell are both white, when it appears to have two irregular brown bands upon a white ground.

West Indies.

C. HANETI, Petit. Pl. 74, fig. 302.

Brown, with reddish brown revolving lines; strongly longitudinally ribbed. Length, 37 mill.

Near Rio Janeiro, Brazil.

I am not acquainted with this species. It was described as a *Murex*, but the want of varices and of an internally thickened lip-margin determines me to place it here.

C. Tissoti, Petit. Pl. 74, figs. 291, 292.

A very doubtful species, described as a *Purpura*, from Bombay; I find no record of its identification by Indian conchologists, however. The two figures at first sight appear to represent different species, one of them resembling a young *Ricinula*; but I have before me West Indian specimens referred to the species by Robert Swift, which are intermediate in character between the two. Is it a variety of *C. Coromandelianus*?

C. sanguinolentus, Duclos. Pl. 74, figs. 293–295.

Variegated with clouds of chocolate, chestnut and yellowish, under a thin olive epidermis; aperture white within; margin of lip and columella blood-red, the latter covered with white tubercles. Length, 1 inch.

Panama (under stones at low water) *to Mazatlan.*

C. hæmastoma, Gray (fig. 294), and *C. Janelii*, Val. (fig. 295), are synonyms.

C. elegans, Gray. Pl. 74, figs. 296, 297.

Chestnut-brown, variegated with white, especially on the nodules. Epidermis short, fibrous, olive-brown.

Length, 1·75 to 2 inches.

St. Elena, W. Columbia (in clefts of rocks at low water); *Panama; Mazatlan.*

This species is more generally known as *C. insignis*, Reeve (fig. 297), but Gray's name and figure were published twelve years earlier.

C. Inca, d'Orb. Pl. 74, fig. 301.

Greenish brown; reddish brown within the aperture.

Length, 20 mill.

Callao, Peru; at 8 or 10 metres.

The figure is a copy of that given by d'Orbigny and is nearly one-half larger than the dimensions given in his text (and above): it is probably inaccurately drawn as it represents an internally thickened and dentate lip margin, whilst the description only mentions a sulcated lip. Is it possibly identical with the last species?

C. ÆQUILIRATUS, Carpenter.

Like *C. insignis* (= *elegans*) but much smaller, with tumid whorls, the ribs continuous to the base, crossed by equal-sized liræ, of which five are shown in the spiral whorls; basal plication of the columella angular. Length, ·98 inch.

Mazatlan; one dead specimen.

Carpenter adds to his above description "(*?pagodus*, Var.)" sandwiched between the generic and specific names, and as synonymy "Comp. *Buccinum pagodus*, Reeve," etc. It is a pity to add to our already overburthened synonymy by describing shells from single dead specimens, and which moreover, so greatly resemble other species as to suggest identity even to those who describe them as distinct. Carpenter was a great sinner in this respect.

C. VARIEGATUS, Gray. Pl. 74, figs. 298, 299.

Variegated with chocolate-brown clouds upon an ashy gray surface, with narrow, crowded, purple-black revolving lines.

Length, 1·25–1·5 inches.

Senegal; Cape de Verd Isles; Rio Janeiro.

Two prior names have been used: *Buc. lineatum*, Gmel., which is really *Littorina angulifera*, and *Murex sulcatus*, Gmel., founded on *Le Tafon*, of Adanson, whose figure is too poor for positive identification with this species.

Purpura viverratoides, Orb. (Vol. II, 168, t. 50, f. 103), placed by me erroneously in the synonymy of *P. hæmastoma*, is a synonym; as is also *Buc. viverratum*, Kiener (fig. 299), erroneously reported from the Mediterranean by that author.

C. DISTORTUS, Gray. Pl. 74, figs. 300, 305.

White, variegated and longitudinally striped with chestnut-brown; epidermis brown-olive, short, scabrous, rather persistent; aperture white. Length, 1·25–1·75 inches.

W. Columbia; Panama.

The thickened, ear-like extension of the posterior margin of the aperture of the adult shell gives it a unique and distorted appearance. The spiral whorls are cancellated by longitudinal ribs and revolving ridges: the former become obsolete on the body-whorl and the latter are only present upon its basal portion,

so that the body is mainly smooth. This and the next species have been erroneously referred by H. and A. Adams and others to the genus *Clavella* (= *Cyrtulus*), the type of which, *C. serotina*, is a fusiform shell, with long canal.

Doubtful Species.

C. PORCATUS, H. and A. Ad. *New Hebrides.*

An unfigured species, said to be a true *Cantharus.*

C. STRIGOSUS, Jonas. *Hab. Unknown.*

The name of Gmelin is quoted in parenthesis and with a query as authority for this species: the *Bucc. strigosum* of that author is, however, a *Cassidaria.*

C. AMŒNUM, Phil. *Hab?*

C. BUXEUS, Brod.

Subfusiform, numerously undulately varicose, transversely striated; brown, transversely lineated with white; aperture white, lip denticulated within. Length 30, lat. 17 mill,

Peru.

Is a *Cantharus*, according to Dr. J. E. Gray, but was described as a *Murex.* I give a copy of a figure in Sowerby's Conch. Illustrations (Pl. 74, fig. 303) which, if it truly represents the shell, shows it to be a *Murex*, closely allied to, if not identical with *M.* (*Ocinebra*) *contractus*, Reeve.

C. CRUENTATA, Gmelin.

In the Index to Vol. II, I have referred a portion of the figures in Küster representing *Purpura cruentata* to Pisaniinæ. Upon re-examining them I prefer to consider them as Küster has done.

C. IMPROBUS, Gould.

In the Index to Vol. II, I have referred this species to *Pollia* (= *Cantharus*). It is said to resemble *buxeus*, Brod., but is shorter. Upon studying the description I believe the balance of characters is decidedly in favor of considering it a *Murex* (*Ocinebra*), as originally described by Dr. Gould. It is unfigured,

and the type, I think, has been destroyed by fire; if this is so, it will probably never be identified with certainty.

C. GUALTIERIANUS, Kiener. Pl. 74, fig. 304.

This is said to be a well-grown specimen of *Purpura Nassoides*, Quoy and Gaimard, but, unless Kiener's description and figure are both at fault, he is very wrong in referring it to a species which differs so materially from his own in having the outer lip thickened and dentate within. *P. Nassoides* is a *Ricinula* and = *R. chaidea* (See Vol. II, p. 187), whilst *Gualtierianus* is probably a *Cantharus* and certainly very closely allied in form and sculpture to *C. fumosus*, Dillw.

Genus **BUCCINUM**, Linnæus.

The group of shells to which the generic name *Buccinum* was originally applied, a century ago, by Linné, has been found by subsequent investigation to contain many heterogeneous forms, and has consequently been greatly subdivided. The name has been retained for the genus typified by *Buccinum undatum*, by common consent, and, I believe, in accordance with the best rules of nomenclature. It is true that Linné's first species—that which is to be selected, as in cases where no type is distinctly specified—is a *Dolium*. But in the case of Linné's genera, he must be considered to have indirectly specified the type, as he has expressly stated that, in his view, where it becomes necessary to divide a group, formerly supposed to be one genus, the original name must be retained for the subdivision containing the most common species; in other words, that the most common species must be considered as the type of its genus. And he must therefore have regarded the *undatum*, the most common of all his *Buccinums*, as the type of the genus.

The Scandinavian naturalists have generally retained the name *Tritonium* of Müller for this genus, but Linné's name has priority by many years. *Tritonium*, as proposed, and as frequently used since, would include both the *Murex* and the *Buccinum* of Linné.

The genus is too well known to require particular description here, and few points require special remark. Among the spiral grooves and striæ or ridges with which the shell is always more

or less deeply sculptured, two kinds may usually be distinguished, a large and a small kind, those of the latter being by far the more numerous, and distributed upon the surface of the others. These kinds we shall call, for convenience, the primary and secondary grooves, or ridges, as the case may be. The difference between them is very conspicuous in *B. glaciale.* The columella has normally three folds, an upper, middle, and lower one; the lower one constituting the oblique inferior margin of the columella. These folds are not always distinct, but all of them may be made out in *B. tenue.* The middle fold is obsolete in most of the species, but is very prominent and tooth-like in *B. ciliatum.* The layers of the shell are very distinct in this genus, the outer coat being most frequently of a brownish color. The periostracum is generally ciliated with minute processes along the lines of growth, corresponding to their intersections with the secondary ridges.

The operculum is oval or subcircular, and may have the nucleus near the centre, or more or less approximated to the posterior (outer) margin, according to the species. On the lingual ribbon, as in all the Buccinidæ, we find three teeth in each row, the central one of which is lamelliform, with denticles on its posterior edge; while each lateral tooth has two strong hook-shaped denticles, with smaller ones between them. The denticles of the central tooth are more numerous than in *Neptunea.*

With one or two doubtful exceptions, the genus *Buccinum* is restricted geographically to the temperate and frigid seas of the northern hemisphere. More careful examination, both of the shell and soft parts of the Antarctic species referred to the genus, is required, before deciding upon their actual pertinence to it.*

Geologically, the history of the genus commences in the Pliocene formation. They are found in the European tertiary deposits of that age, even as far south as the shores of the Mediterranean. They become very numerous in the Pleistocene deposits, both of Europe and North America, but reach their maximum development in the existing seas.

The shells of the genus *Buccinum* are peculiarly liable to

* The Antarctic as well as tropical species described as *Buccinum* all belong to other genera; the genus is limited to northern seas.— G. W. T., Jr.

variation both in form and sculpture, and to obsolescence or erosion of the surface-markings. The identification of imperfect or worn specimens is extremely difficult in this genus.* The late Dr. William Stimpson studied with great care the species of *Buccinum*, having before him fine suites of specimens and possessing a special experience in this genus which few of his successors can claim to have enjoyed. I think it inadvisable, however, to use his published researches as the skeleton of the present monograph, subscribing to the doubt expressed by Dr. Jeffreys that "Whether all those which he reckoned distinct will stand the test of a more extensive examination of this extremely variable group is questionable." During the fifteen years that have elapsed since the publication of Stimpson's researches, the number of nominal species has been largely increased, mainly through the labors of W. H. Dall in Arctic Western America, of Verkrüzen in the waters of Newfoundland, and of Sars and Friele in Norway; still, no monography of the genus subsequent to that of Stimpson, has appeared. The earlier monographs by Reeve, Küster and Kiener contain, of course, heterogeneous assemblages of species belonging to numerous genera and are therefore almost utterly valueless for the purpose of comparison and classification of the species.

I annex the synoptical table of species given in connection with Stimpson's monograph.

Very few of the later species being known to me autoptically, I fear that this portion of my work may be considered autoschediastical by some of my brother conchologists.

The great variability of the species, a common characteristic of Arctic mollusca, has caused almost every student of the Buccinæ, to estimate differently the range of variation permissable within specific limits, so that what is referred to by one author as *B. undatum*, for instance, may include less or more than the specific form as herein limited, or as understood by all others; may include portions of related species, which thus become dismembered and themselves distributed among their allies or may refer exclusively to forms herein characterized as distinct.

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* William Stimpson, in *Canad. Nat. N. S.* II, 364. 1865.

Synoptic Table of the Species of Buccinum.

According to Dr. Wm. Stimpson.

A. Body-whorl angulated or carinated.
  a. Primary transverse ridges flat; secondary ridges inconspicuous.
    1. Shell thin; aperture not patulous; outer lip not sinuated.
      * Whorls shouldered; aperture broadest above. B. POLARE.
      ** Whorls scarcely shouldered; aperture broadest below. B. GRŒNLANDICUM.
    2. Shell thick and strong; aperture patulous; outer lip sinuated.
      * Shell elongated. B. DONOVANI,
      ** Shell ovate. B. GLACIALE.
  b. Primary transverse ridges convex; secondary grooves very distinct. B. ANGULOSUM.

B. Body-whorl not angulated.
  a. Aperture narrow.
    1. Primary ridges flat. B. STRIATUM.
    2. Primary ridges convex; a strong tooth-like plait on the columella. B. CILIATUM.
  b. Aperture broad.
    1. Longitudinal folds numerous, often interrupted or interposed.
      * Primary ridges flat. B. PLECTRUM.
      ** Primary ridges obsolete; secondaries conspicuous, crowded. B. TENUE.
    2. Longitudinal folds not interrupted or interposed.
      * Shell thick and coarsely striated.
        † Sinus of outer lip near the suture, columella short. B. UNDULATUM.
        †† Sinus of outer lip near the middle, columella projecting. B. UNDATUM.
      ** Shell finely striated, usually thin.
        † Secondary ridges easily distinguished from the primaries, which are often obsolete.
          || Columella distinctly folded. B. SIMPLEX.
          || || Columella smooth, not distinctly folded. B. CYANEUM.
        †† Secondary ridges confounded for the most part with the primaries
          || Longitudinal folds conspicuous. B. TOTTENI.
          || || Longitudinal folds obsolete. B. HUMPHREYSIANUM.

Since the preparation of my manuscript on *Buccinum*, Dr. J. Gwyn Jeffreys has published a paper upon their synonymy, which, in view of his discriminative ability and experience with

Northern marine shells, is entitled to the careful consideration of those specially interested in the correct elimination of specific forms. I have not thought it advisable to change the synonomy in accordance with Dr. Jeffreys' views, because my conclusions, carefully worked out from the (inadequate) material accessible to me, ought therefore to have a certain value, but I deem it advisable to insert here Dr. Jeffreys' paper in full for the purpose of comparison with my own results—results which would doubtless have been much modified if this paper had been published before I commenced my study of the genus. It will be seen that a good number of species included in my monograph are omitted from Dr. Jeffrey's paper.

*On the Northern Species of Buccinum. By J. Gwyn Jeffreys.**

"The late Prof. Stimpson published, in the 'Canadian Naturalist' for October, 1865, a 'Review of the Northern Buccinums.' and gave sixteen species with fifteen synonyms. Having had the privilege of examining his types, as well as those of Linné, Fabricius, Turton, Bennett, Broderip, Forbes, Möller, Hancock, Mörch, Reeve, G. O. Sars, Friele, Verkrüzen, and others, I thought a revised list of the species might be useful, and I now submit it. I recognize eight species only, with forty-six synonyms; and I believe even that number of species may be reduced when more intermediate forms are observed. Their fecundity and extensive distribution in the northern hemisphere, added to the difference in the conditions of habitat and temperature, would account for the great variability of the species. *Buccinopsis* connects *Buccinum* with *Fusus*. The generic name *Tritonium* is undoubtedly subsequent to *Buccinum*, and included *Fusus*, and what I consider its subgenera, viz., *Sipho*, *Neptunea*, *Chrysodomus*, *Volutopsis*, and *Boreofusus*.

1. Buccinum glaciale. Linn.

B. carinatum, Phipps. *B. polaris*, Gray.

Vars. B. angulosum, Gray. B. Donovani, Gray.
" B. Grœnlandicum, Hancock (not Chemnitz).
" B. tubulosum, Rve. B. undatum, Dawson (not L.).
" B. Hancocki, Mörch. B. turritum, Verkrüzen.

* Annals and Mag. Nat. Hist., 5th Ser., VI, 423, Dec. 1880.

2. Buccinum undatum, Linn.

B. vulgare, Da Costa.

Vars. B. striatum, Pennant. B. zetlandicum, Forbes (a deep-water form).
" B. Labradorense, Reeve. B. Belcheri, Reeve.
" B. fragile, Verkrüzen. B. conoideum, G. O. Sars.
Monstr. B. carinatum, Turton. B. acuminatum, Brod.
" B. imperiale, Reeve.

3. Buccinum Grœnlandicum, Chemn.

B. cyaneum, Brug. *B. undatum*, Fab. (not L.). *B. tenebrosum*, Hanc.

Vars. B. Donovani, Gould (not Gray). B. ciliatum, Gld. (not Fabr.).
" B. boreale (Leach), Gray. B. undulatum, Möller and Dawson.
" B. Humphreysianum, Möll. (not Bennett), B. sericatum, Hanc.
" Tritonium ovum, Midd (not Turt.). B. fusiforme, Kien. (not Brod.).
" B. Perdix (Beck), Mörch. B. Finmarkianum, Verk. (a deep-water form).
" B. pulchellum, G. O. Sars. B. parvulum, Verk. B. sulcatum, Friele.

This species is closely allied to *B. undatum*; and both may be one and the same species. Herr Friele has shown that the cuspidation of the odontophore is not a reliable character for distinguishing the species of this genus.

4. Buccinum Hydrophanum, Hanc.

Vars. B. tumidulum, G. O. Sars. B. Mörchi, Friele. B. nivale, Friele.

5. Buccinum Humphreysianum, Benn.

B. anglicanum, Fleming (not Lamarck). *B. Puxleianum*, Leach.

Vars. B. ventricosum, Kiener. B. striatum, Philippi (not Penn.).
" B. Kieneri, Monterosato. B. inflatum, Benoit (not Deshayes).

Not *B. Humphreysianum*, of Möller, Lovén, Middendorff, M. Sars, Danielssen, or Malm.

6. Buccinum Totteni, Stimpson.

B. Terræ-novæ (Beck), Mörch. *B. undulatum*, Hanc. (not Möll.).

Vars. B. plectrum, St. B. Packardi, St. Tr. simplex, Midd.
" B. Amaliæ, Verkr. B. elegans, Verkr.

7. Buccinum tenue, Gray.

B. scalariforme (Beck), Möll. *Tr. Ochotense*, Midd. *B. tortuosum*, Rve.

8. Buccinum ciliatum, Fabr.

B. cyaneum, Hanc. (not Brug.). *B. Molleri*, Reeve.
Tr. tenebrosum (as of Hancock), var *borealis*, Midd."

B. UNDATUM, Linn. Pl. 75, figs. 306–321; Pl. 76, figs. 322–325; Pl. 78, figs. 361–366.

"Shell conical above the periphery or centre of the body-whorl, and somewhat truncated at the base, more or less solid (according to the habitat), opaque, and usually lustreless; sculpture, numerous fine thread-like spiral ridges, some of which are much stronger than others and are arranged in bands (from three to seven small ridges between every large one); the whole surface is covered with extremely delicate and close-set longitudinal striæ, which seldom, however, cross the spiral ridges so as to cause any decussation; the upper portion of the body-whorl and of the four or five preceding whorls is often strengthened by curved ribs or folds (like buttresses), of which there are from twelve to fifteen on the penultimate whorl; top whorl smooth; the base is girded by a very large, strong, and obliquely-twisted keel. Color mostly yellowish white, tinged with reddish brown, sometimes white banded with the latter color, or reddish brown with a pink tinge and beautifully mottled with white; inside yellow, white, pale reddish brown or chocolate. Epidermis pale brownish yellow, rather thin, usually rising into close-set laminar folds, corresponding with the longitudinal striæ, which form short, spinous processes on the outer ridges. Spire regularly tapering, apex blunt and irregular or mammiform; whorls seven to eight, rounded, the last occupying about two-thirds of the shell; suture deep; mouth oval and somewhat expanded; length about one-half that of the spire; canal open and deep, exhibiting outside a similar and oblique notch; outer lip semicircular, flexuous, and having a large sinus or bay in the middle; it slopes outwards from the periphery; edge reflected and thickened in full-grown specimens; inside slightly and indistinctly grooved; inner lip broad, consisting of a rather thick glaze on the pillar and adjacent part of the body-whorl; pillar smooth and highly polished, microscopically freckled or pustulated by the lower fold of the mantle. Operculum pale brownish yellow, rather solid, more or less concave towards the nucleus; the layers of growth are laminar and numerous, resembling the epidermis in texture. Length, 3·25 inches; diameter, 2 inches.

"Var. 1. FLEXUOSA. More slender, with a produced spire;

whorls apparently twisted, in consequence of the ribs being obliquely curved.

"Var. 2. LITTORALIS (King). (Fig. 316.) Ventricose; spire shorter, and body-whorl disproportionately large; longitudinal plaits strong; throat often coffee-colored.

"Var. 3. PAUPERCULA. Dwarf and depauperated.

"Var. 4. STRIATA (Fig. 319). Thinner than usual, with the longitudinal ribs nearly obliterated.

"Var. 5. PELAGICA (King). Twice the usual size, and also thinner, with a longer spire.

"Var. 6. ZETLANDICA (Forbes). (Fig. 364.) Smaller, and of a thin and delicate texture, destitute of longitudinal ribs; epidermis smooth and membranous.

"Monstrosities. 1, *sinistrorsum* (fig. 321). Spire reversed. 2, *carinatum*. Upper part of each whorl encircled by a keel or more prominent spiral ridge. (*B. carinatum*, Turton). 3, *imperiale*. Body-whorl compressed and elongated, so as to give it the shape of a *Voluta*, (*B. imperiale*, Reeve, Pl. 78, fig. 365). 4, *acuminatum* (fig. 320). Spire extending to a considerable length; whorls flattened, and the periphery consequently angulated (*B. acuminatum*, Brod.). 5, *conico-operculatum*. Operculum patelliform or conical. 6, *bi-operculatum* and *tri-operculatum*. Having two or three opercula.

Animal. "Body varying in color from dirty white to yellowish, speckled or streaked with black; mantle rather thick, folded over the pillar of the shell; pallial tube extensile, protruded an inch or more beyond the canal, recurved, and obliquely truncated at the extremity; head small, narrowish; proboscis very long and powerful, enclosing a muscular sheath, within which lies the tongue; tentacles flattened, long and pointed, abruptly thickened at the base; eyes very small, placed nearly one-third of the way up the tentacles; foot oblong, with shelving sides, capable of considerable expansion and distension, rounded in front, with small ear-shaped corners, and bluntly-pointed behind; very large and fleshy, with a short point at the extremity. Odontophore (Pl. 27, fig. 29): central tooth armed with seven cusps or points

in a comb-like manner; shaft of the side tooth having three notches, the lowest being the largest." *

Arctic Ocean; Siberia; Sea of Ochotsk; North Cape; Norway; Baltic Sea; England; France, (Atlantic Coast); Iceland; Labrador; Newfoundland, southwards to New Jersey; Mediterranean Coast of France (exceptional).

B. undatum being the typical species of the genus, I have deemed it advisable to copy the somewhat extended diagnosis of the British specimens given by Jeffreys. I add his further remarks in order to complete the portraiture of the species: the diverse conditions under which the varieties are found perhaps sufficiently account for their existence.

"Habitat: Every kind of ground, in all parts of the British seas, from the shore to the greatest known depths. The first variety is peculiar to hard ground in the coralline zone, throughout the Hebrides, Orkneys and Shetland; it is not common. Second, among stones and on mud, in the higher part of the laminarian zone, north of England, as well as Ireland, Scotland, and Shetland. Third, brackish water at Southampton and Ipswich. Fourth, coralline zone of England, Wales and Ireland; not common. Fifth, Dogger bank; Mr. Leckenby has a specimen six and one-half inches long. Sixth, soft ground in the deep-water zone, west of Ireland, outer Hebrides, Orkneys and Shetland; I have a specimen of a pure white color. Besides these, which I regard as the principal varieties, others have been described by Professor King and Mr. A. Hancock.

"In horticultural language, the species is very much given to sporting. Every abnormal growth of the shell can be distinguished from those of a specific or varietal sort by examining the apex or nucleus; this will be seen to be regular, the malformation having subsequently taken place, and being in most instances caused by some injury to the outer edge of the mantle.

"The typical form and variety *striatum* have been recorded from every recent geological formation in the northern latitudes of both hemispheres, and as far back as the Coralline Crag; Palermo (Philippi). Mr. James Smith found the monstrosity *carinatum* fossil at Bute, and Mr. Grainger at Belfast.

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* Jeffreys, Brit. Conch. IV, 285.

"American specimens of the common sort are smaller than European; and Stimpson endeavors to show that they belong to a distinct species, because of 'a *facies* difficult to describe.' * If the supposed difference cannot be defined by any words or delineation, and the only substitute offered is the nearly exploded idea of representation of species, it is a pity that naturalists should be so unnecessarily perplexed.

"In Scotland and Shetland this common shell-fish is called 'Buckie,' in the Isle of Man (according to Forbes) 'mutlag,' in Holland 'wulk' (Born), in France 'bouche-aurore' (Lamarck), at Brest 'grosse bigorne' and at Rochelle 'burgau morchon' (De Montfort), and in La Manche 'ran' (De Gerville).† The animal emits a thin and copious slime. From its size and toughness it makes a good subject for anatomical demonstration—although Cuvier has left very little to be known about that part of its history.‡ It burrows in the sand like *Natica catena;* and its foot is similarly traversed by numerous canals, which admit of its being distended by water; this enters by an orifice at the upper corner of the mouth of the shell, and finds its way, through the abdominal cavity, into the vascular system of the foot. When it burrows, the end of the pallial tube or siphon is either exposed or but slightly covered by the sand, so as to supply the gills with water or air as the case may require. Beudant's experiments show that it cannot live in fresh water. The formation of two opercula by the same individual appears to be congenital, and not owing to an injury of the opercular lobe, which would cause an aborted or defective growth; for in some of these monstrous specimens the twin opercula are so large that they are doubled or folded inwards, side by side, in order to fit the mouth of the shell. This mollusk is very voracious, and is often caught

* In his Synoptical Table, Stimpson distinguishes the American form (*B. undulatum*) by its short columella, and the sinus of the outer lip being near the suture instead of near the middle. These distinctions usually hold good, but not always: it is not difficult to find American specimens with the European characters, and *vice-versa*.

† The common generic name in English is "whelk."

‡ Details of the anatomy and embryology of *Buc. undatum*, will be found in the introductory portion of Vol. II of this Manual, with illustrations upon Plates 3, 4 and 8.

on the fishermen's hooks. Örsted tells us, in his interesting treatise 'De regionibus marinis,' that great numbers of *B. undatum* and *Fusus antiquus* are collected in the Cattegat for fish-bait, by putting a dead cod into a wicker basket and letting it down on a muddy bottom; it is soon taken up half-filled with whelks. The same method is adopted for their capture on the English and Irish coasts. The whelk affords an illustration of the *lex talionis;* fishes in their turn devour it with equal greediness. I have seen between thirty and forty shells of *B. undatum* extracted from the stomach of a single cod. After the shell has been cleared out and ejected by the fish, it makes a convenient habitation for the hermit-crab. Other nations have not quite so great a fancy as ours for eating the whelk; perhaps it is an indigenous taste; for when the Romans were in this country, they seem to have acquired it—being one which they could not gratify in Italy. Shells of *B. undatum*, mixed with those of the oyster, have been noticed among the ruins of a Roman station at Richborough. At the enthronization feast of William Warham, Archbishop of Canterbury, on the 9th of March, 1504, there were provided '8000 whelks at 5*s*. per 1000.' In the shell-fish market at Billingsgate the present species goes by the name of the 'white' or 'common' whelk, in contradistinction to *Fusus antiquus*, which is there called the 'red' or 'almond' whelk. My obliging informant, Mr. Baxter, says, 'Wilks must be sold the same day we receive them at market in the summer, being the day after they are caught; if the supply is greater than the demand, we boil them, and they keep good for several days.' Evidence was given before a select committee of the House of Commons in the Session of 1866, on the 'Whitstable oyster-fishery extension Bill,' that the whelk-fishery on a sandy flat in that bay yielded £12,000 a year,—part of the produce being disposed of in the London market for food, and the rest sent to the cod-fishing banks for bait. They are seldom eaten in the northern part of our Isles. At Dieppe and Nantes they may occasionally be seen exposed for sale in the fish-markets. The embryology of *B. undatum* has been investigated by Baster and many other writers. Its curious spawn-cells are figured in Ellis' Corallines as '*Alcyonium seu Vesicularia marina* of Bauhin;' they are

also called 'Sea wash-balls,' because of their being used instead of soap by sailors to wash their hands (fig. 312). Dr. Johnston compares this vesicular mass to the nest of the humble-bee. It is composed of numerous cartilaginous pouches, of the shape and size of a large split pea, piled irregularly one upon another, and attached by their edges at the base. Cailliaud counted 544 of these cells in one of the spawn-masses. Each cell contains at first several hundred eggs, which are afterwards so greatly reduced in number that only from fifteen to thirty fry come to maturity. The process by which this reduction takes place has been disputed by Scandinavian and English physiologists, not less as to *Buccinum* than with respect to *Purpura*. Koren and Danielssen state that the eggs are first spherical, that they afterwards separate into distinct portions, and then amalgamate or agglomerate and assume a different shape. Sir John Lubbock, on the contrary, ascertained that the more advanced embryos swallow the other yelks whole, and in such quantities as to become greatly distended; his paper in the 'Report of the British Association' for 1860 contains a representation of 'a young embryo in the act of swallowing an egg' (figs. 306, 307). Dr. McIntosh observed two specimens of the variety *littoralis*, on the 19th of October, 1863, in the act of depositing spawn under a stone, about mid-tide, in a rock-pool at St. Andrews. An egg-case, extruded from one of these whelks which he held in his hand, was quite soft, and fell into the water like a ball of jelly. Before the fry leaves its cell, it is furnished with two rounded and ciliated lobes in front, a proboscis, eyes, foot, gills, heart, otolites or ear-stones, and other organs, besides a perfectly formed shell of two whorls and an operculum. The spawning season takes place according to the latitude and climate, between October and May; about two months are required for the development of the fry. The shells vary exceedingly in thickness; some are solid and coarsely ribbed; others are thin, and their sculpture is very delicate. Sometimes the top of the shell is broken off, and the opening is closed by a plug. In young specimens the nucleus of the operculum is more central than in the adult, the lateral extension of growth being inwards or towards the pillar. Mr. Dennis and Mr. Norman believe that the scalariform distortion of the whorls, which is not unfrequent, is occa-

sioned by an annelid occupying the suture; but the epidermis in such cases may be traced covering that part, and the distinction between *post hoc* and *propter hoc* may apply to the opinion of the above naturalists, as well as to the arguments of lawyers. The shell is the 'roaring buckie' of Scotch bairns. Wordsworth has amplified this idea in the following pretty lines:—

> 'I have seen
> A curious child, who dwelt upon a tract
> Of inland ground, applying to his ear
> The convolutions of a smooth-lipped shell;
> To which, in silence hush'd, his very soul
> Listen'd intensely, and his countenance soon
> Brighten'd with joy; for murmurings from within
> Were heard,—sonorous cadences, whereby,
> To his belief, the monitor express'd
> Mysterious union with its native sea.'"

"Whelks are taken in great numbers in wicker baskets baited with offal. Billingsgate Market is chiefly supplied from Harwich and Hull; and some of the steamers from the north bring six or seven tons at a time. They are sold at 1*s.* 6*d.* to 2*s.* a measure; are in season from August to September, though they are really good to eat at any time. Whelks are very troublesome to the lobster-fishers, for they often devour the bait, and I have seen, at St. Margaret's-at-Cliffe, on the Kentish coast, the lobster pots drawn up, one after the other, baitless, and full of these greedy mollusks; most trying to the poor fishermen, especially when bait was scarce, and they had been obliged to walk some miles in the morning to purchase it. On some parts of the coast the fishermen use the *Buccinum* for bait for the long-line fishing, and they know it by the following names, viz., the conch, buckie, whelk-tingle, or sting-winkle; and at Youghal they call whelks 'googawns,' and 'cuckoo shells.'"—*Lovell's Edible Mollusks*, 125.

Mr. Lovell gives the following recipes for preparing whelks for table-use: I copy them because, notwithstanding its abundance on our northern coast the whelk is rarely eaten in the United States.

Dublin Method of Cooking Whelks.—Cleanse them well, boil

them till they can easily be taken from the shell, and then fry them with plenty of fat or butter, till they are brown.

Whelk Soup.—Take two onions and cut them into small dice, fry them in a stewpan with some butter; shake the pan well for a few minutes, add five heads of celery, two handfuls of spinach, two cabbage lettuces cut small, and some parsley. Shake the pan again, put in two quarts of water, some crusts of bread, a teaspoonful of pepper, and a blade or two of mace. Let this boil gently for an hour. Boil the whelks, take them out of their shells and fry them a good brown, then add them to the soup and let the whole boil a few minutes, then serve.

Another Way of making Whelk Soup.—Wash the whelks well, boil them and pick them out of the shells. Put an ounce of butter or dripping, with some finely chopped parsley, an onion, a little pepper and salt, into a saucepan, and fry it until it becomes brown, adding a little flour. Then to this add a pint of water or a pint and a half of milk, and when it boils place in the whelks, and a teaspoonful of anchovy. Let it boil again for half an hour, then serve.

To Dress Whelks.—Boil them till quite tender, then eat them with vinegar and pepper.

On a diminutive form of Buccinum undatum ♂: Case of Natural Selection. By Edw. S. Morse. (Figures 308–311.)

The object in making this communication is to point out some curious results of natural selection on *Buccinum undatum* within limited areas, in which the male scarcely equalled half the length of the female.

On a ledge in the harbor of Eastport (Maine), just east of the town, a small variety of *Buccinum undatum* occurs in great profusion. At the time of collecting them the sexes were pairing, and in every case (and hundreds were observed) the male was much smaller, sometimes not exceeding half the length of the female. It seemed impossible that the males could be mature, and yet they were not only found in actual connection, but an examination of the shell revealed the full number of whorls, and from other well-known characters indicated the fact that they were full-grown, though of diminutive size,

A glance at the condition of things at once revealed the mystery of these dwarfed males. The ledge on which these specimens were found is partly exposed at low tide, and is at all times washed by impetuous currents, so that it is quite difficult to land.

A study of the surface features of the ledge indicated the force of the tidal currents. There were no loose fragments of rock upon it, save those which were so tightly wedged in the crevices of the ledge that they could not be worked out with the hands. The specimens of *Buccinum* in every case were found hid away in nooks, and concealed in the cracks and crevices marking the ledge. It was clearly obvious that only the smallest males could work their way into such constricted quarters for the purpose of uniting with the females, and that the smaller males had the advantage over the larger males in this respect, there could be no question. The true state of the case was so instantly seen, that though hundreds of specimens were collected with the object of determining whether in any case a large male occurred, not a single exception was met with in which the female was not being fertilized by a diminutive male.

The constrained position in which these were found precluded the possibility of a large male with his cumbrous shell getting close enough to the female in her narrow quarters to perform the sexual act. The smaller males having this advantage, have from generation to generation perpetuated their dwarf characters. It would seem from these facts that natural selection has worked in an unusual way in producing secondary sexual characters, rarely, if ever, seen in gasteropods.

Both males and females presented a wide range of variation in the characters of the shell, some of them showing very distinctly the oblique folds so characteristic of the species, while in others these folds were scarcely visible. The shell of the male is smoother than that of the female, and is also more slender and more delicate. The figures represent normal males and females from this peculiar colony.*

Gould supposed that *Buc. undatum* did not occur south of Cape Cod, Massachusetts, a point believed in his day to separate

* Proc. Bost. Soc. Nat. Hist., XVIII, 284, 1876.

very distinctly two molluscan faunal provinces, but it has since been found throughout the waters of the New England States, and, according to Captain Gedney, off New Jersey, N. lat. 40°, W. long. 73°, in 32 fathoms, sandy bottom. It occurs generally in deep water, and not so numerously, however, south of Cape Cod. It has been dredged at 100 fathoms in the Bay of Fundy, but off the European coast has been found as deep as 650 fathoms.

Mr. Verrill remarks that "the ordinary American specimens from shallow water differ considerably in form from the typical European specimens, but the species is quite variable on both coasts, and I have examined large specimens from St. George's Bank and La Have Bank, dredged by Mr. S. I. Smith, which differ very little from the common European form, and it is easy to form series connecting these with our common shore specimens. I am, therefore, unable to agree with Dr. Stimpson, who considered our species distinct from the European, and adopted the name *undulatum* for it."*

In addition to the varieties enumerated in Dr. Jeffrey's description of the species, I have figured others from Sars, Middendorff and Reeve; they are possibly none of them really entitled to varietal names. These are Var. *cærulea* (fig. 314), Var. *Schantarica* (fig. 317), from the Sea of Ochotsk, *B. pyramidale*, Reeve (fig. 366), *B. Labradorense*, Reeve (fig. 322) = the American form of *B. undatum*, called *B. undulatum*, and a representation of the latter form (fig. 318) from Gould's Invertebrata of Massachusetts. To these synonyms I add *B. parvulum*, Verk. (fig. 323), *B. fragile*, Verk. (fig. 324), and *B. conoideum*, Sars (fig. 325); species which can have no place in the genus unless we agree to a minute discrimination of its variable characters. It is true that a slight difference exists in the dentition between one of these forms and the normal dentition of *B. undatum* (Pl. 27, fig. 29), namely, a variation in the number of tooth-like points developed on the plates, the formula of *B. undatum*, *B. conoideum* and *B. parvulum* being 4 · 6 · 4, that of *B. fragile* 3 · 4 · 3, according to Sars, but Meyer and Möbius† have shown that the central

* Rept. U. S. Fish Com'r, 638, 1875.

† Fauna der Kielerbucht II.)

teeth vary from 4 to 6, and those on the sides from 2 to 4 in specimens from a single locality, and that the number on opposite side-plates of the same individual is sometimes different, so that but little dependence can be placed upon the secondary characters of dentition in distinguishing species, at least in this instance.

Dr. J. Gwyn Jeffreys considers *B. Belcheri*, Reeve, a variety; it appears to me to be distinct.

B. ZEALANDICUM, Reeve. Pl. 79, fig. 384.

Yellowish, the revolving lines between the ribs brown tinted. Length, 1·25 inch.

? New Zealand.

This species never came from the locality assigned to it: it is a true *Buccinum* and may be a form of *undatum*, having accidentally deepened color upon the superior revolving lines, or, if the color is normal, then it is probably a variety of *B. cyaneum*, Brug.

B. EFFUSUM, Reeve. Pl. 79, fig. 376.

Shell ovately conical, thin, inflated, spire rather short but elevated, whorls obscurely flatly ridged and minutely striated; lip simple, effused; chestnut-brown. Length, 1·5 inches.

Hab. unknown.

The ridges of this species are of quite a superficial character. The above is a copy of Reeve's description, which does not mention longitudinal ribs, although they appear to be slightly indicated in the figure. I do not know whether this may be a depauperated *Buc. undatum* or a *Cominella*.

B. TOTTENII, Stimpson. Pl. 76, fig. 326.

White; of a light and thin structure; spire acute; suture impressed, whorls seven, regularly convex; longitudinal folds about twenty-two in number, not large, very regular, straight, not at all oblique, and about equaling their interspaces in width; these folds are prominent on the spire, but usually obsolete on the body-whorl, except occasionally at the suture; the revolving striæ are somewhat as in *B. undatum*, but sharper and more regular, and the grooves are narrower and more deeply cut.

Length, 1·75 to 2·25 inches.

Banks of Newfoundland.

It might be taken for a thin and delicate form of *B. undatum*, but is easily distinguished by the number and straightness of the longitudinal plications of the spire-whorls, the more numerous and sharply cut transverse ridges and the wider mouth. Occurs in the pleistocene beds of Montreal.

B. TENUE, Gray. Pl. 76, fig. 327.

Whorls convex; with twenty-five to thirty longitudinal ribs, sometimes interpolated about the middle of the body-whorl; no prominent revolving sculpture, but merely crowded minute striæ, sometimes obsolete. Length, 1·75 to 2·5 inches.

Greenland, southwards to Gulf of St. Lawrence; Nova Zembla; Lapland; Behring's Straits.

This is a circumpolar species, possessing the well-known facies of such shells; its occurrence southwards in the Gulf of St. Lawrence is rare and in deep water. It is a pleistocene fossil in various localities from Canada northwards. The well-expressed, very numerous, curved and partially duplicating ribs and the almost total absence of transverse sculpture are its distinguishing characters. *B. scalariforme*, Beck, is possibly a synonym, although it is also referred to *Sipho Kroyeri*, Moller. Besides the typical form, Middendorff mentions a *forma elatior*, in which the ribs tend towards evanescence. *B. tortuosum*, Reeve, is considered a monstrosity of this species by Stimpson, but I think it more probable that it has that relation to *Fusus* (*Sipho*) *Kroyeri*, Moller.

B. PLECTRUM, Stimpson.

Shell rather large, thin, elongated, whorls less convex than in *B. tenue*, with about nineteen curved longitudinal folds, and deep cut primary revolving grooves, with depressed intervening ridges.

Length 2·23 to 2·5 inches, diam. 1·2 inches.

Arctic Ocean, north of Behring's Straits; 20 to 30 fathoms.

It may be described in brief language by saying that it has nearly the form and plaits of *B. tenue*, with a striation of the *glaciale* type. It evidently approaches nearest to *tenue*, but besides the difference in the striation, the much greater regularity of the longitudinal plaits will serve to distinguish it. I have among a number of fossil Buccinums kindly loaned by Dr.

Packard, two imperfect specimens, probably of this species, from the pleistocene beds of Portland, Me. The shell is broader and thicker, with fewer (thirteen) longitudinal folds, none of which are interrupted, the primary ridges are more convex, and are alternately wider and narrower. The secondary grooves are rather less numerous. These differences may proove to be specific, when perfect specimens of both forms can be obtained in sufficient numbers. If so, I would suggest the name *B. Packardi* for the Portland form. It is easily distinguished from *B. undulatum* (= *undatum*) by the flattening and finer striation of the primary ridges, which are also much broader than the corresponding grooves. I have also a fragment of the form *Packardi* from the pleistocene of New Brunswick.

The above is copied and condensed from Stimpson's description. I am unacquainted with the species. Dr. Gwyn Jeffreys considers it a variety of *B. Totteni*, Stimpson.

B. STRIATUM, Sowb. Pl. 76, figs. 328, 329.

Shell of moderate size, thick, rather elongated and appressed; whorls seven, not convex, not angulated, longitudinal ribs eleven in number, not at all oblique, rather distant and prominent, especially at the suture; spiral ridges flat; aperture narrow, a little less than half the length of the shell, columella projecting beyond the extremity of the outer lip. Length, 2 inches.

Sea of Ochotsk.

Occurs as a pleistocene fossil in Scotland, whence it was first described. Dr. Stimpson unites with this *B. Ochotense*, Middendorff (fig. 329), and Dr. Jeffreys makes it a synonym of *B. tenue*, Gray.

B. GLACIALE, Linn. Pl. 76, fig. 345; Pl. 78, figs. 367–373.

Whorls flattened, spire conic-elevated; ribs few, obliquely curved, prominent; body-whorl with one, two or three prominent revolving keels, one of which is sometimes visible on the spire; revolving ridges coarse, well marked. Length, 2–3 inches.

Behring's Straits; Sea of Ochotsk; Spitzbergen; Greenland.

The typical form, according to Stimpson, has not as yet been found fossil, but the var. (*B. Grœnlandicum*, Hancock = *polare*, Gray) is quite abundant in the pleistocene beds of Montreal. The living shell reaches a notably larger size in the North Pacific

than in the North Atlantic, and the vicinity of Behring's Straits may be considered the metropolis of the species. It has been erroneously reported as from the Orkney Islands, but is not British. Mr. W. H. Dall, to whose enlightened explorations in Alaska conchology is so greatly indebted, was the first to point out the protean characters of this species and to assign to it a numerous synonymy. I have figured the typical *glacialē* (fig. 345) and a two-carinated form (fig. 367), *B. angulosum*, Gray, evidently not adult (fig. 368), and regarded by Stimpson as a distinct species, *B. carinatum* (fig. 372), *B. rutilum* (fig. 369), *B. Rombergi* (fig. 370), and *B. Mörchianum* (fig. 371), of Dunker's *Novitates*. Besides these, *B. Stimpsoni* and *B. Rogersi* of Gould, two unfigured species from the vicinity of Behring's Straits, are referred to this species by Mr. Dall.

Var. POLARE, Gray.

This form has been described but not figured; nevertheless, Stimpson recognizes it as a distinct species differing from *B. glaciale* in its thin structure, shouldered whorls and narrower aperture. *B. Grœnlandicum* of Hancock (fig. 373), which I consider equivalent to *polare*, is also treated as distinct by Stimpson, who says that it is narrower and smaller, without shouldered whorls. This latter difference depends upon whether one or two carina are developed on the body-whorl. I think the only reason for considering *polare* (including *Grœnlandicum*) as a variety is the thinness of the shell.

B. MIRANDUM, E. A. Smith.

Shell ovate, thick, pallid, brownish red, irregularly maculated upon the spiral ribs, invested with a fugacious, thin, light olive epidermis; whorls seven, concave and angulated above, concave below the angle, longitudinally plicate, encircled by two nodose ribs, and shallow sulcations, minutely granosely striate, beneath the suture somewhat rugose; aperture light brown, scarcely more than half the total length, labrum sinuated by the spiral carinæ, canal short, slightly recurved. Length 53, diam. 25 mill.

East Yesso, Japan; 11 fathoms.

The plications which produce nodules on the spiral elevations become almost obsolete on the last half of the body-whorl. The nodules number about ten on the penultimate whorl. The entire

surface is spirally rather distantly striated, which is plainly visible to the naked eye, and also very minutely granosely striated, only apparent with the aid of a lens. I do not know the species, but it appears to be related to *B. glaciale*, Linn., some specimens of which certainly exhibit, though in a less marked degree, perhaps, the principal characteristics noted above.

B. DONOVANI, Gray. Pl. 76, fig. 330; Pl. 78, fig. 374.

More elongated, with much more convex whorls than *B. glaciale*. Sometimes slighty carinated on the middle of the body-whorl. Ribs most prominent at the sutures, which they undulate, soon becoming evanescent upon the body.

Length, 2·25 to 3 inches.

Banks of Newfoundland; Greenland.

The *B. Donovani* of Reeve is another species = *B. Terræ-Novæ*, Beck. *B. tubulosum*, Reeve (fig. 374), is, however, a synonym. Dr. J. Gwyn Jeffreys makes *Donovani* a variety of *B. glaciale*.

B. CASTANEUM, Dall.

Shell large, clear chestnut-brown, with whorls seven in number, inflated and smooth, except for microscopic, closely crowded, revolving striæ. Suture distinct, not channeled. Apex rather acute, pointed. Columella straight, with a faint fasciole. Aperture wide, rounded, more than semicircular. A slight glaze on the columella. Outer lip heavily thickened, expanded and smooth, not projecting before the column nor waved; within livid whitish or purple.

Length 2·5 in., diam. 1·1 in.; length of aperture 1 in., width ·75 in.

Shumagin Islands (Alaska), 20 fathoms.

A very remarkably distinct form in a genus where distinctness is the exception and not the rule. I know of no species at all resembling it. There are rarely faint costæ on the junior whorls.

Var. TRICARINATUM, Dall.

This form, which I now consider to be probably an extreme race of the foregoing, has a similar color and fine microscopic sculpture, but grows larger and is furnished with one strong carina on the junior whorls and three on the last whorl. When the lip is not formed they are remarkably similar to young *Chrysodomus*

liratus, and were passed over as such by me, in the field. Afterwards, when the carinæ and lip are fully formed, they look like brown *B. glaciale* of the carinated form. On examination, the sculpture was found to be essentially different, and by that alone its connection with *B. castaneum* is surmised. It is found in the Western Aleutians only, and was caught with bait in five fathoms. No intermediate specimens have been observed. Length 3·08 inches, width 1·5 inches; aperture long, 1·25 inches; wide, ·9 inch. The lip is less thickened than the typical *B. castaneum*.

The above is a copy of Dall's description. I am unacquainted with the species.

B. CYANEUM, Brug. Pl. 76, figs. 331–342; Pl. 78, fig. 375. Pl. 79, figs. 377–380.

Shell thin, whorls six to eight, not very convex, flattened near the suture, and generally smoother than in any other species; longitudinal folds, when they exist, ten to fifteen, straight, extending very little below the suture; primary spiral ridges rounded, not flattened, very narrow and distant, about fourteen on the lower whorl, often obsolete, but sometimes sufficiently prominent to form angles rather than ridges; secondary ridges, when present about five to each primary ridge and groove taken together. Colors bright but variable, usually bluish with chestnut-brown revolving lines or series of spots or patches: sometimes brown with white spots. Periostraca smooth or short-ciliated.

Length, 1–2·3 inches.

Greenland, Norway, Lapland, Behring's Straits.

An arctic species; occurs fossil in the pleistocene of Rivière-du-Loup, Canada. A number of authors apply to this shell the name *Grœnlandicum*, Chemn., which I do not adopt because Chemnitz was not a binomial writer, and *Grœnlandicum* is only a portion of his compound designation of the species.

I figure a variety *patula*, Sars. (fig. 332), which appears to correspond with the dwarf variety of Stimpson; also *Neptunea Baerii*, Midd. (fig. 377), which is a marked, short, convex variety. The following species described by Hancock, are all synonymous with *cyaneum*, viz.: *B. hydrophanum*, Hanc. (figs.

333, 334, 375), *B. sericatum*, Hanc. (fig. 335),* *B. tenebrosum*, Hanc. (figs. 336–338, 378). Mr. W. H. Dall adds to the synonymy *Volutharpa Mörchiana*, Fischer, a short-spired variety (fig. 379), and *B. perdix*, Beck, to which I agree, the latter being very probably the same as *B. Finmarkianum*, Verkruzen (figs. 340–342), which is at most a variety. *B. Terræ-Novæ*, Beck, is a large, thin variety, showing traces of plicæ, and revolving angulations. *B. leucostoma*, Lischke, an unfigured species from Japan, is very probably another variety of this protean species: it is a large shell, 81 mill. in length, like *Terræ-Novæ*, but thicker, with white lip, etc. *B. simplex*, Midd., from the Sea of Ochotsk, is also a large shell, the description of which presents no distinctive peculiarities. *B. pulchellum*, Sars (fig. 339), does not appear to be very different from his figure of *Grœnlandicum* (= *cyaneum*, fig. 331). I add a figure of a remarkable shell (Pl. 87, fig. 617), which Friele calls var. *acuta*.

B. Japonicum, A. Ad.

Ovate, fusiform, thin, spire produced, epidermis horny brown, longitudinally plicate and laminate, with acute, revolving lines (about six in the last whorl), base spirally lirate, lip margin thickened and reflected. Length, 1 inch.

Okosiri, Sea of Japan; 35 fathoms.

Unfigured. Probably nearly related to the preceding species. *B. Jeffreysii*, E. A. Smith, is another unfigured Japanese species, 30 mill. in length; it is described from a single specimen, with the following remarks appended. "This species may eventually prove but a large and fine variety of *B. Japonicum*, A. Ad.; but at present I distinguish it with a separate name, since there are several differences which may be regarded as specific. The whorls are only slightly angulated in the middle by the keel which encircles them at that part; and this keel is undulated, a

* Mr. E. A. Smith figures the dentition of this form in Ann. Mag. N. Hist., XX, 134, 1877, and as the side plates have three fangs on one side and two on the other, and the epidermis differs, he considers it distinct from *B. cyaneum*. Mr. Jeffreys, in same magazine, p. 239, calls attention to the variability of the epidermis in northern shells, and mentions that he had examined numerous specimens of *sericatum*, and had no doubt of their specific identity with *cyaneum*. The unequal distribution of denticles upon the side plates of the radula, is itself sufficient evidence of the little value of this character.

character not assigned to *B. Japonicum:* the red spotting on the keels is also absent in that species; and the color of the epidermis is different. At the base of the cauda in the present species there is a largish excavation; but I am inclined to attribute it to a repaired injury."

B. FISCHERIANUM, Dall.

Shell with four whorls, of which the upper three form less than one-sixth of the entire length, though acuminated. Epidermis smooth, thin, yellowish, marked with very fine, wavy, revolving lines, not ciliated. Surface of the whorls smooth, but marked with rather evident lines of growth, which are raised into plicate rugosities near the suture, which is appressed. Whorls inflated, amply rounded, solid, porcellanous and strong. Aperture elongate-ovate; outer lip thickened, broadly, effusely arched. Peristome white. Throat of a muddy pink. Inner lip with a thin callus, thicker on the columella, where it is colored with a dash of deep pink. Columella twisted, broad, arched. Canal wide and shallow, very short. Color externally yellowish pink, upper whorls a little livid, last whorl with a few indistinct revolving brown lines, frequently interrupted. Traces of obscure revolving ridges appear in a few places on the last whorl.

Length 1·3 in., lat. ·9 in.

St. George's Isl., Behring's Sea.

Described from one perfect specimen and fragments obtained in 1868. Its nearest ally is that form of *B. cyaneum* described by Fischer as *Volutharpa Mörchiana.* From this it is very doubtfully distinct.

B. PICTURATUM, Dall.

Shell of moderate size, rather slender, with acute apex, sculptured with fine wavy striæ, the interspaces between which are usually flat, but occasionally rise above the general surface as flattened threads; junior whorls with seven to nine faint, very oblique transverse costæ, the prominence of which varies in different specimens; epidermis very thin, smooth, dehiscent; color whitish, painted with oblique, reddish brown flammules, irregularly distributed in patches transverse to the whorls; columella twisted with a strong fasciole, lightly glazed; outer

lip smooth, entire, slightly thickened, white on the edge, orange-yellow within, extending a little in advance of the columella; apex rather acute, suture appressed; whorls seven, regularly tapering, not inflated; lip not waved posteriorly, and meeting the whorl at a rather sharp angle.

Length 2·18 in., width 1 in.; length of aperture, 1·05 in.

Aleutian Islands.

A very doubtful, unfigured species. The original description is given above. Probably = *B. cyaneum*, var.

B. CILIATUM, Fabricius. Pl. 79, figs. 381, 382.

Shell small, ovate, strongly ribbed and with fine revolving striæ; solid, becoming very thick with age; aperture elliptical, elongated and narrow, a little more than half the length of the shell; outer lip scarcely at all sinuated; columella with a distinct tooth or projection near its lower extremity, corresponding to the second fold of the columella seen in several other species, such as *B. tenue* and *B. undatum*, but more tooth-like and constituting an important and easily recognized specific character; periostraca ciliated. Length, 1·54 in.

Greenland, Nova Scotia, Newfoundland,
Behring Straits, and the Arctic Sea north of it.

"Although *B. ciliatum* is the most distinct and well-marked form in the genus, it is by no means a common species, and has been frequently referred to other quite different species, for want of attention to its peculiar characters." So says Dr. Stimpson, but I must confess my inability to separate it satisfactorily from *B. cyaneum*. If I rightly understand the specimens before me, I think that it will prove to be a dwarf, slow-growing race of the last-named species. *B. ciliatum* of Gould and American authors generally, is a very different shell and is equivalent to *B. Humphreysianum*, Bennett. It is the *B. Molleri* of Reeve's Index, and *B. tenebrosum* of Middendorff (fig. 382).

B. FRINGILLUM, Dall.

Shell white, resembling *B. sericatum*, Hancock (= *cyaneum*), on the one hand, and *B. ciliatum*, Fabr., on the other. It has the dense fringed epidermis of *ciliatum* (when the shell is perfect), with the sculpture of the same, but wanting the tooth on the columella, and having a number of sharp carinæ not found in

any specimens of *ciliatum* which I have seen. The form is much like that of *sericatum*, Hanc., except that the whorls are inflated and shouldered, and the suture canaliculate. Whorls seven.

Length 1·36 in., width ·8 in.; length of aperture ·66 in.

Arctic Ocean, near Icy Cape.

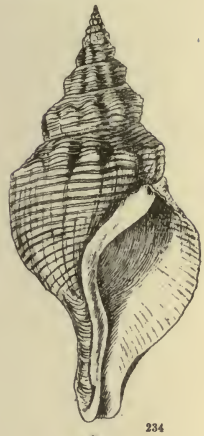
The above is Mr. Dall's description, who, moreover, appends n. s.? to the name. It is a very doubtful species, the canaliculate suture being its only peculiar feature, and that would indicate its pertinence to the genus *Volutharpa*.

B. Humphreysianum, Bennett. Pl. 76, figs. 343, 344; Pl. 77, figs. 346–352; Pl. 79, figs. 383, 385.

Shell thin, subtranslucent or nearly opaque, pale brownish or yellowish, sometimes mottled with fawn or reddish brown, or irregularly banded with rows of spots or chain-like markings, frequently without spots or mottlings; sculpture numerous fine close-set revolving lines; no longitudinal ribs, or at most but faint indications of them upon the spire-whorls; periostraca very thin, ciliated. Length, 1·75–3·5 inches.

Shetland Is.; Ireland; Norway; American Arctic Ocean; Banks of Newfoundland; Lapland; Coast of Provence, France; Sicily.

Dr. Gwyn Jeffreys says that "Dr. Stimpson must have mistaken some other species (perhaps *B. ciliatum*) for. *B. Humphreysianum* when he described the latter as having a ciliated epidermis; and I therefore cannot recognize the North American localities indicated by him. *B. ventricosum* of Kiener (from the coast of Provence), is closely allied to our shell; but the whorls are more tumid and gibbous, and the operculum is not so disproportionately small. They bear the same relation to each other as *Aporrhais Serresiana* does to *A. Macandreæ*. The operculum bears the same proportion to the size of the mouth as that of *Aporrhais;* it seems to be more ornamental than useful, like the coquettish hats worn by the girls of Tuscany on the crown of their heads. The opercular lobe covers only the centre of the operculum, the upper and under sides of which are sometimes encrusted with sessile Foraminifera. The egg-cases are separate and hemispherical. Some of the above characters are so peculiar as perhaps to warrant the generic separation of *B. Humphreysianum*, under the name of *Mada*, its surface being glabrous."



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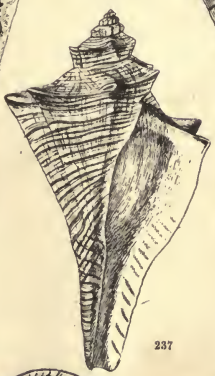

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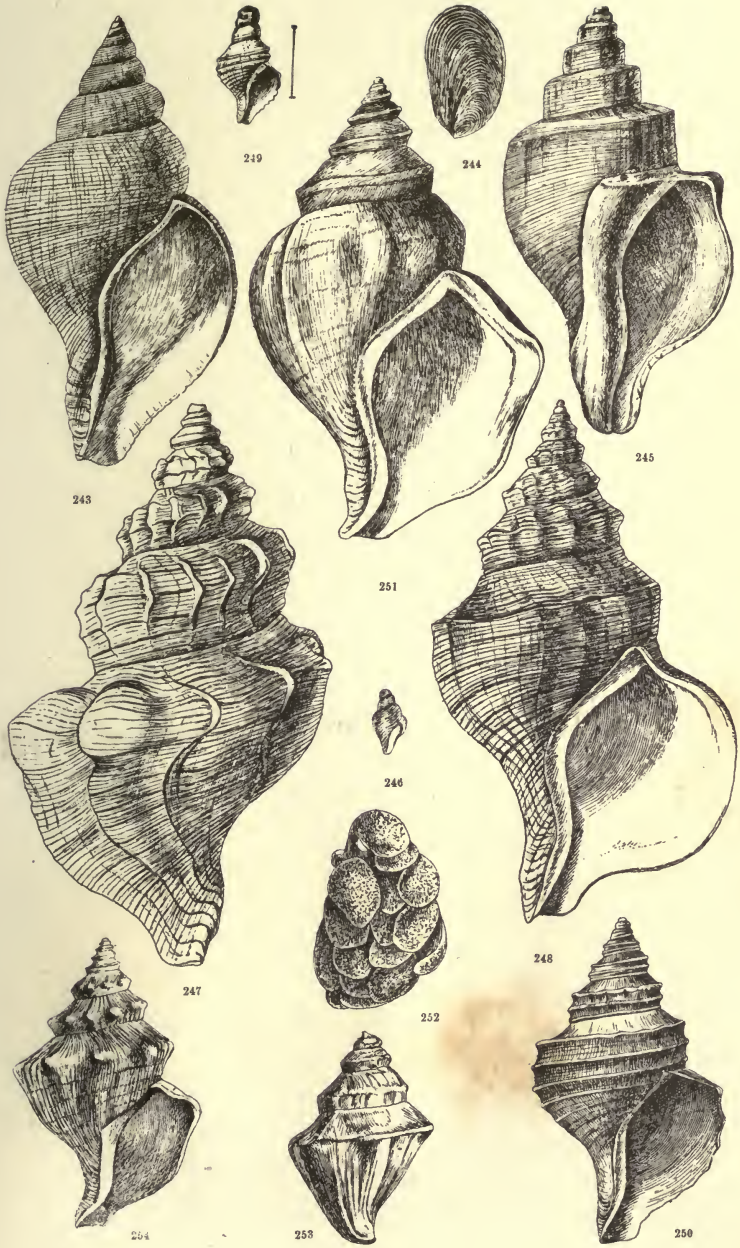
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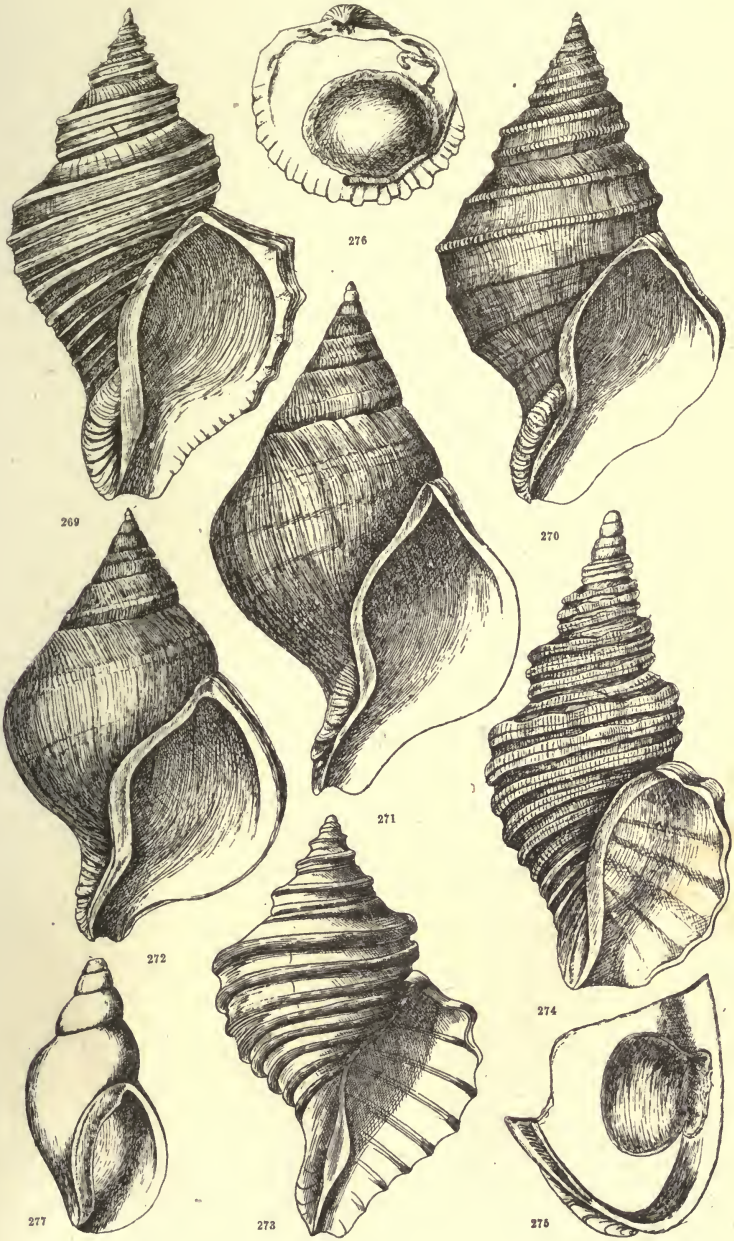
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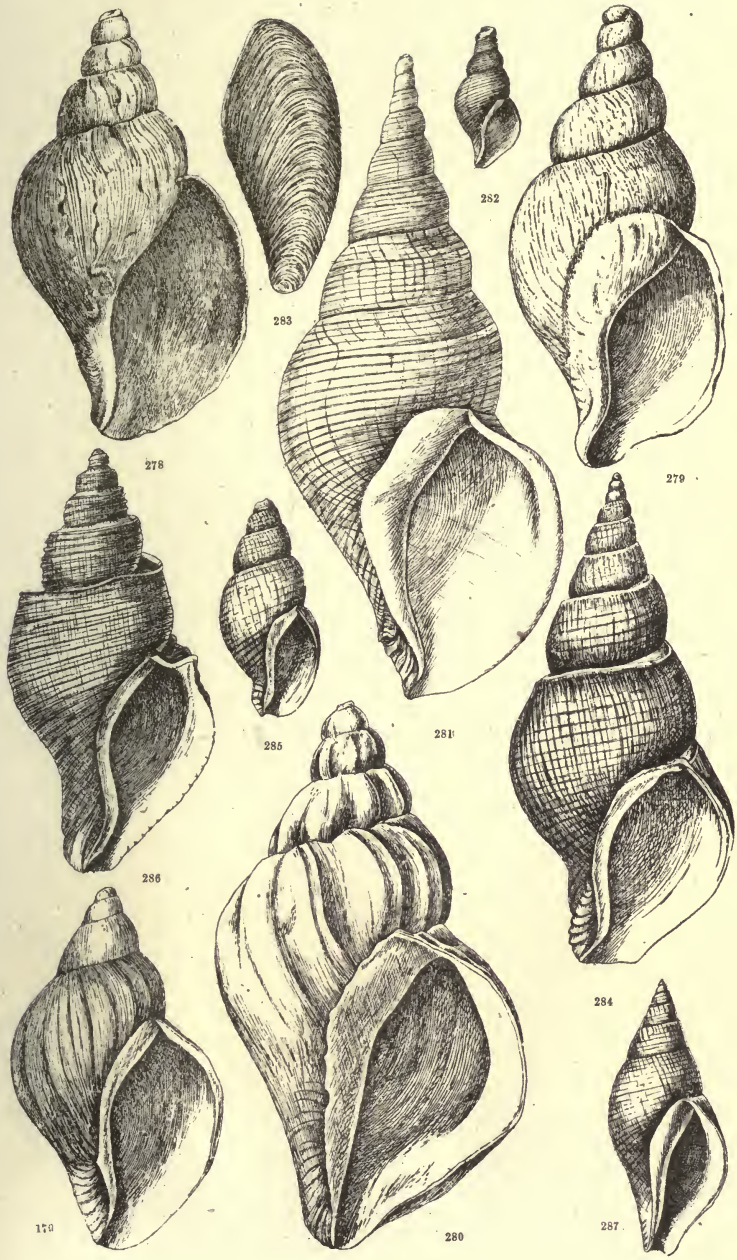
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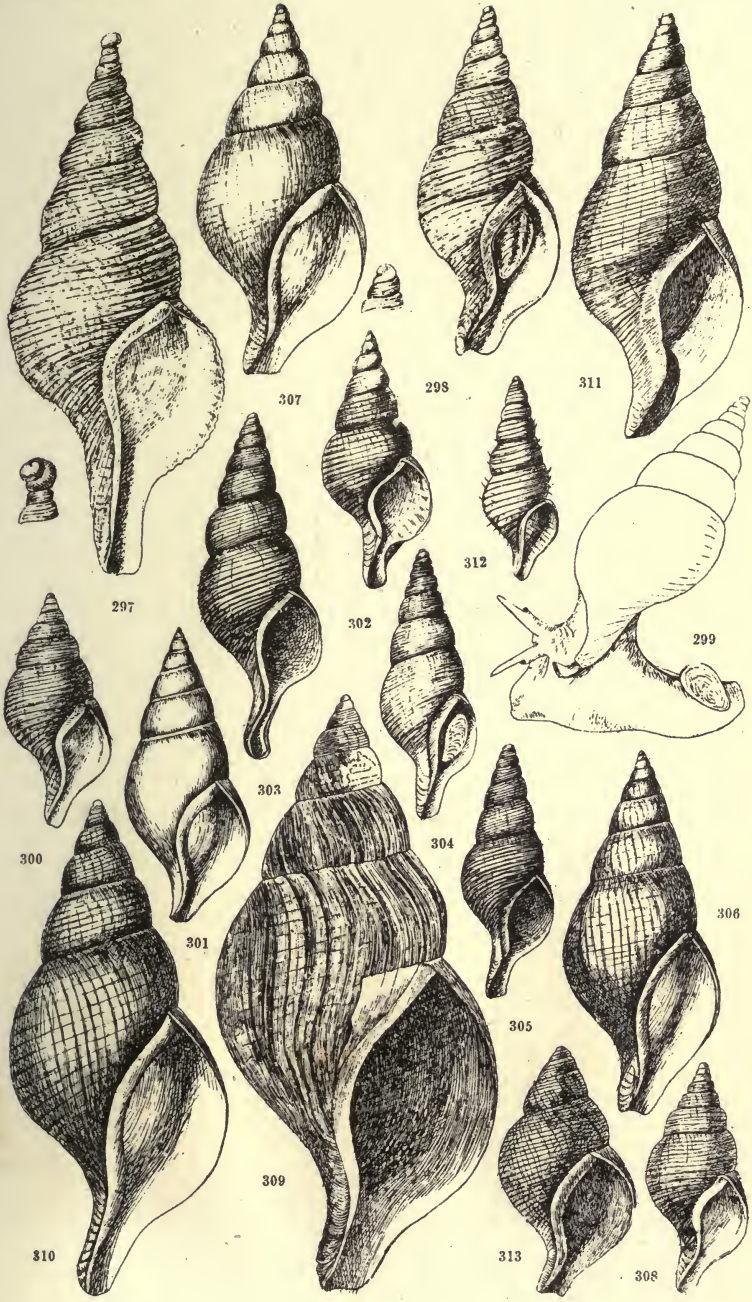
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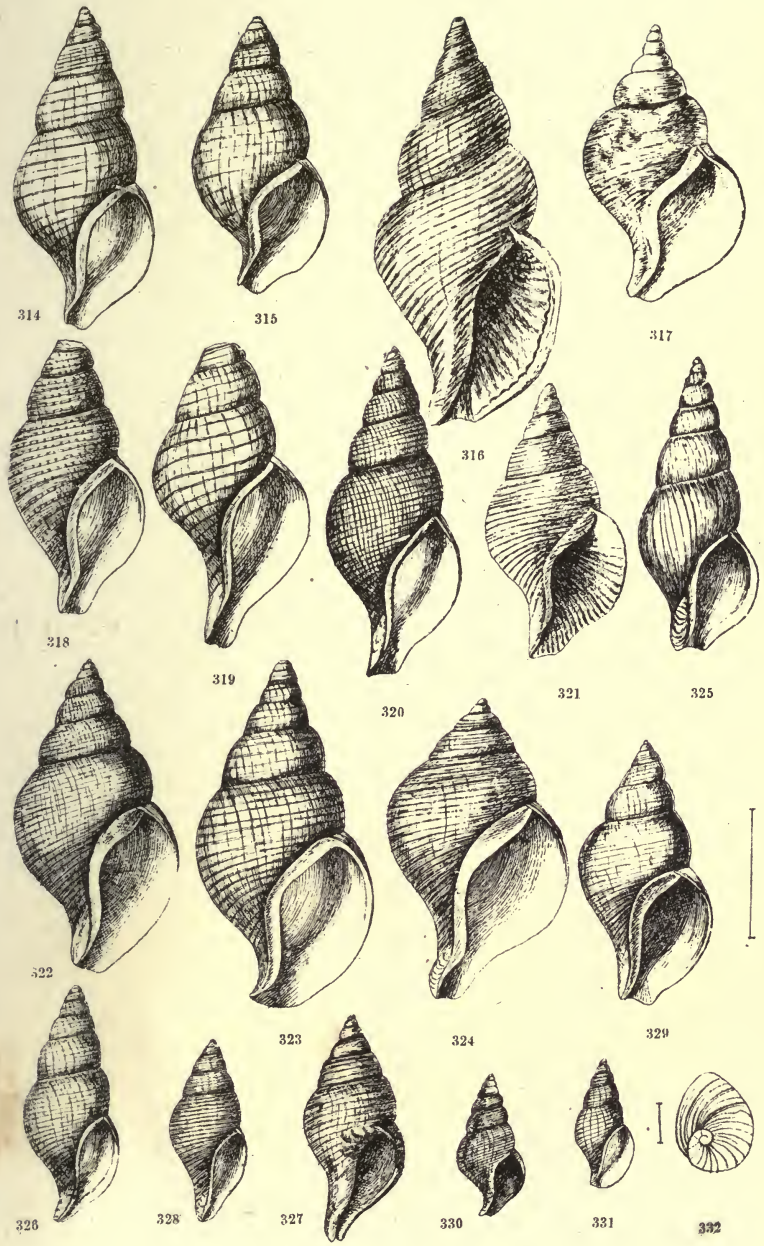
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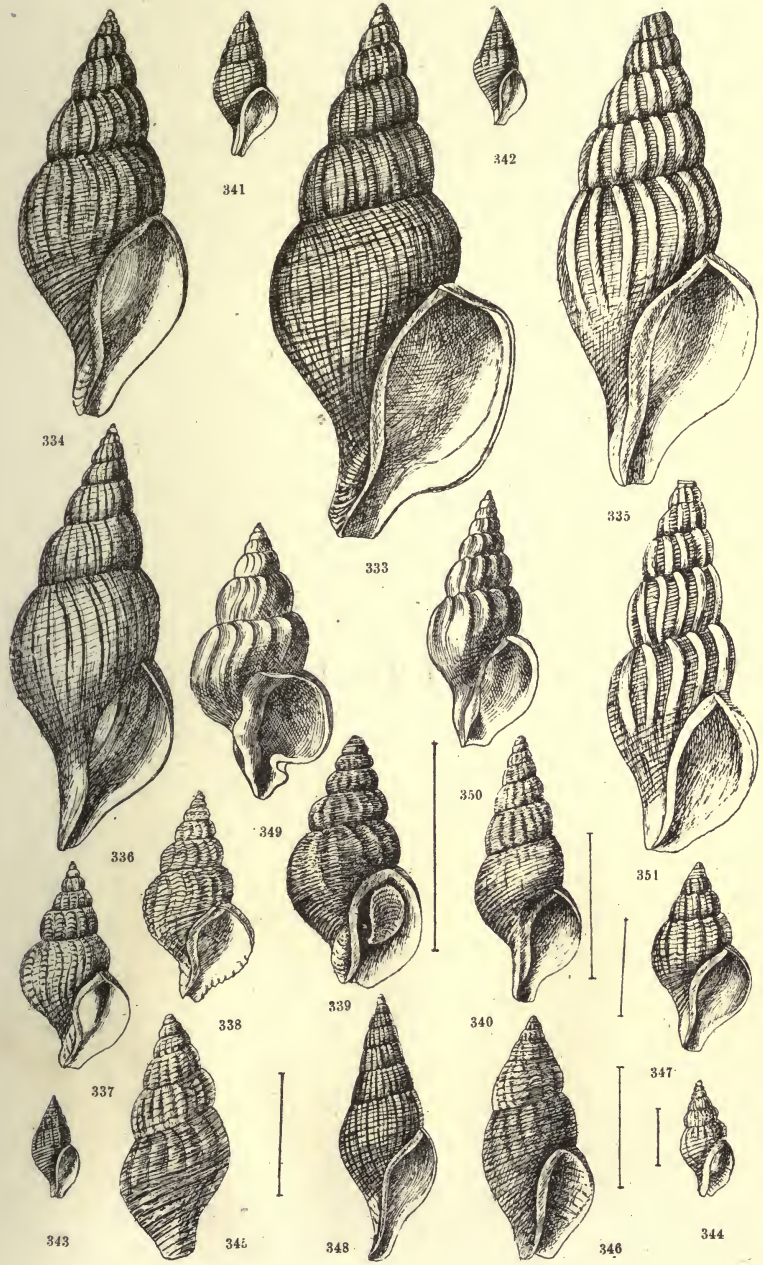
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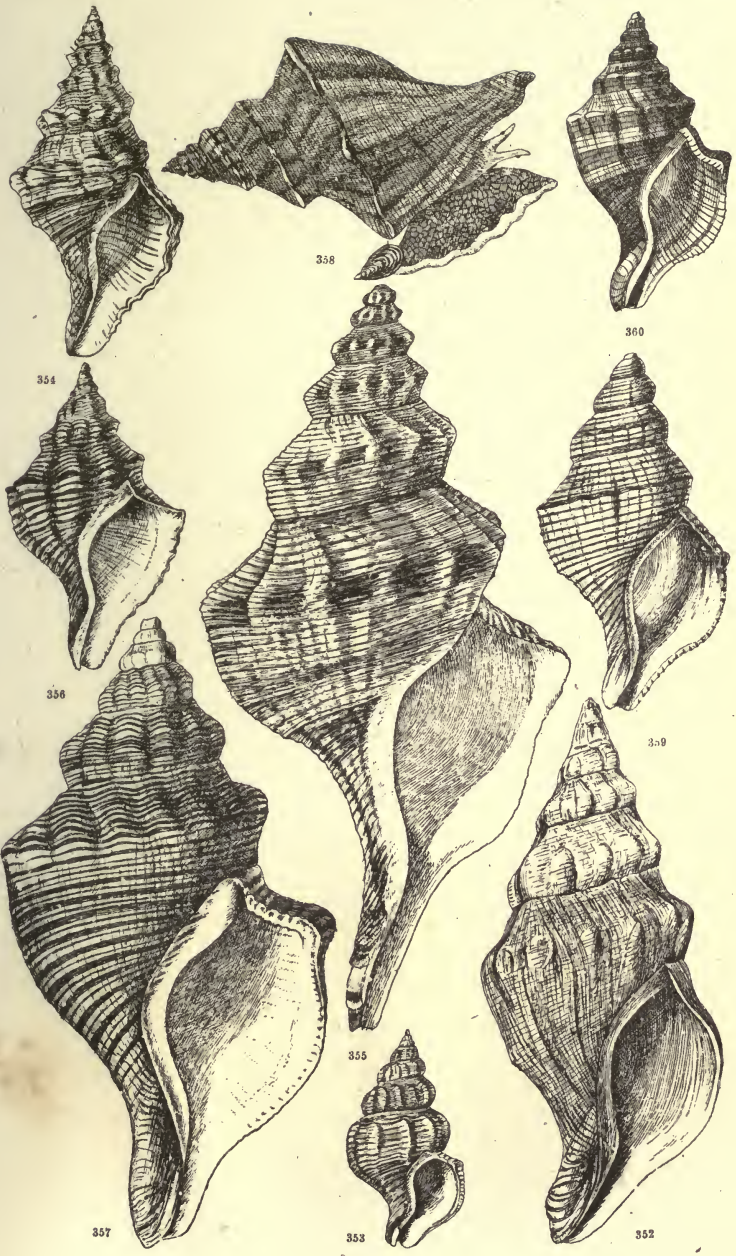
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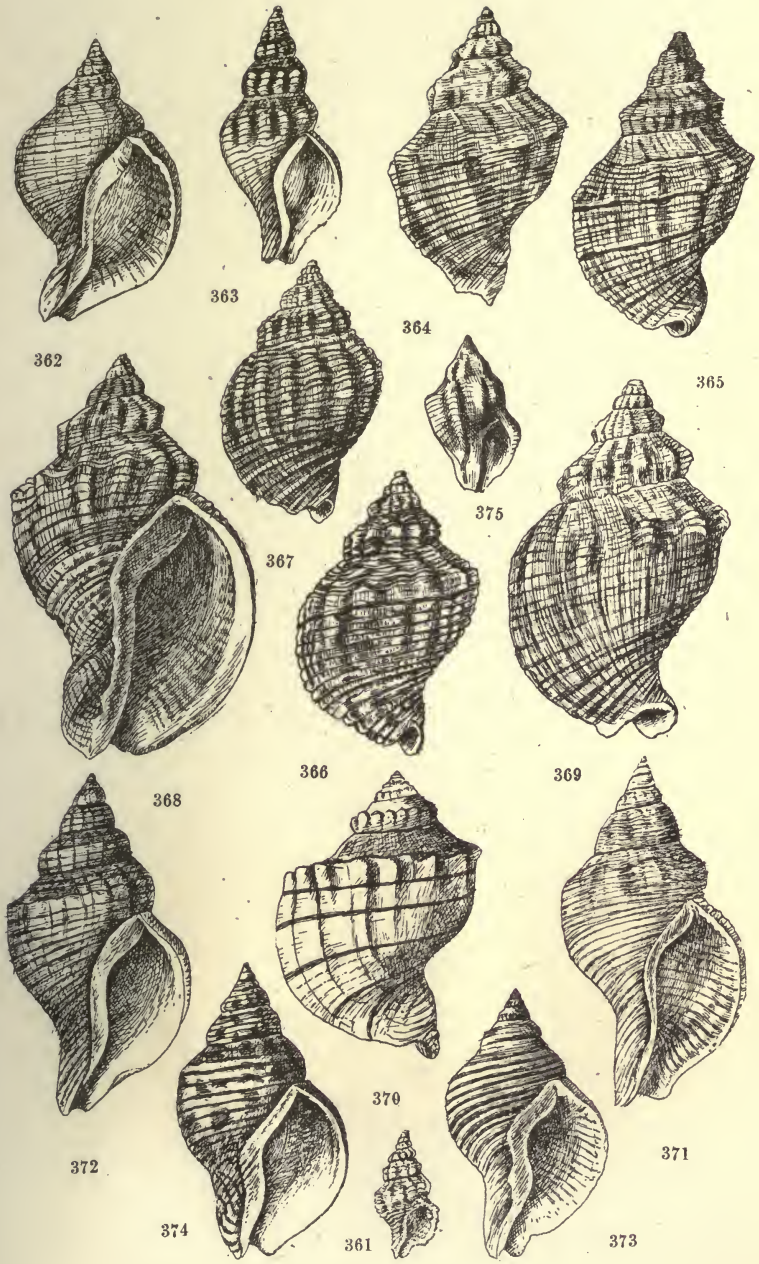
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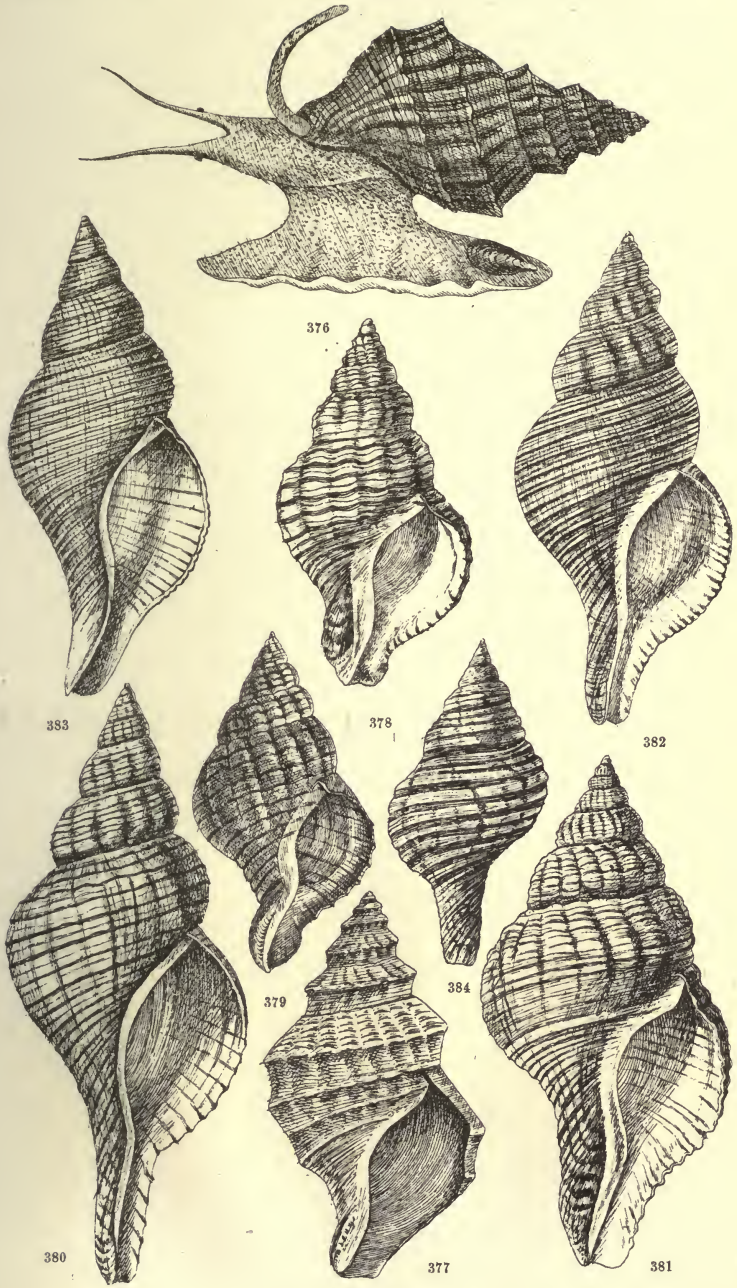
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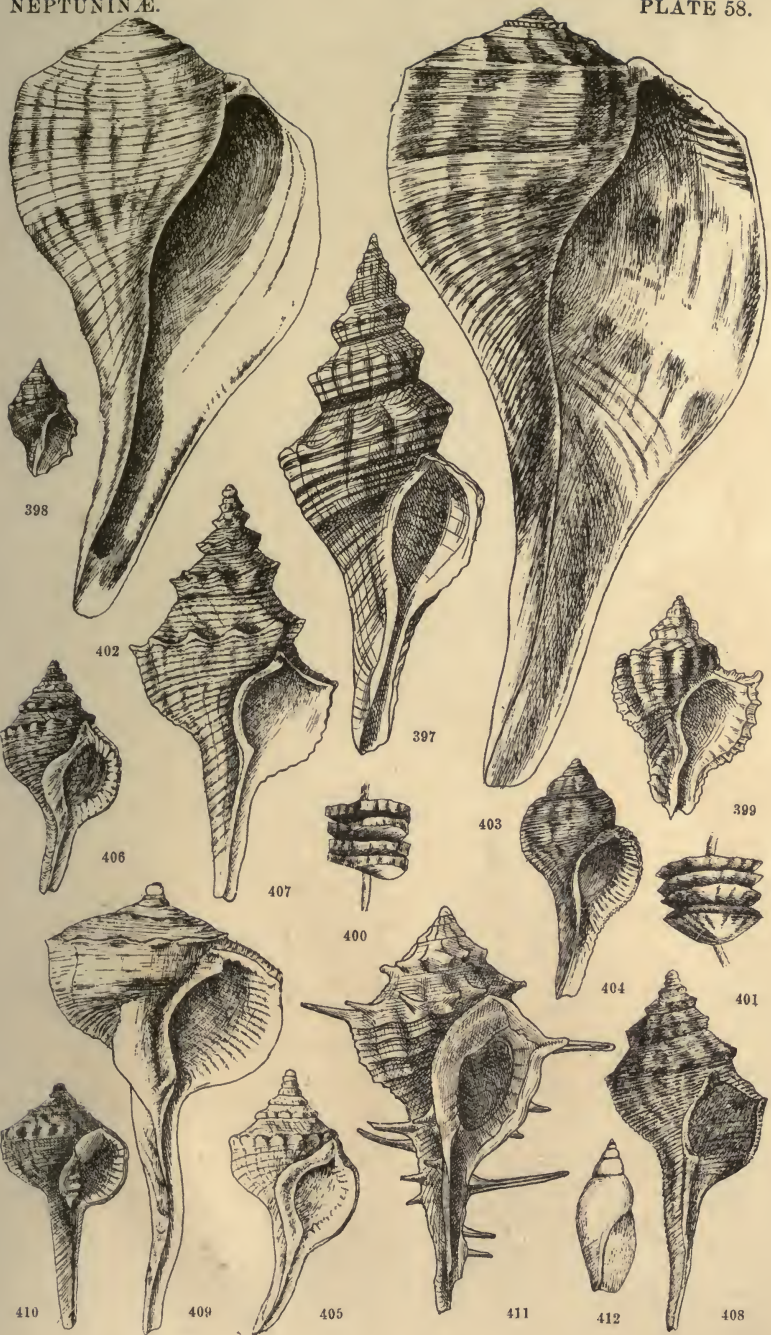
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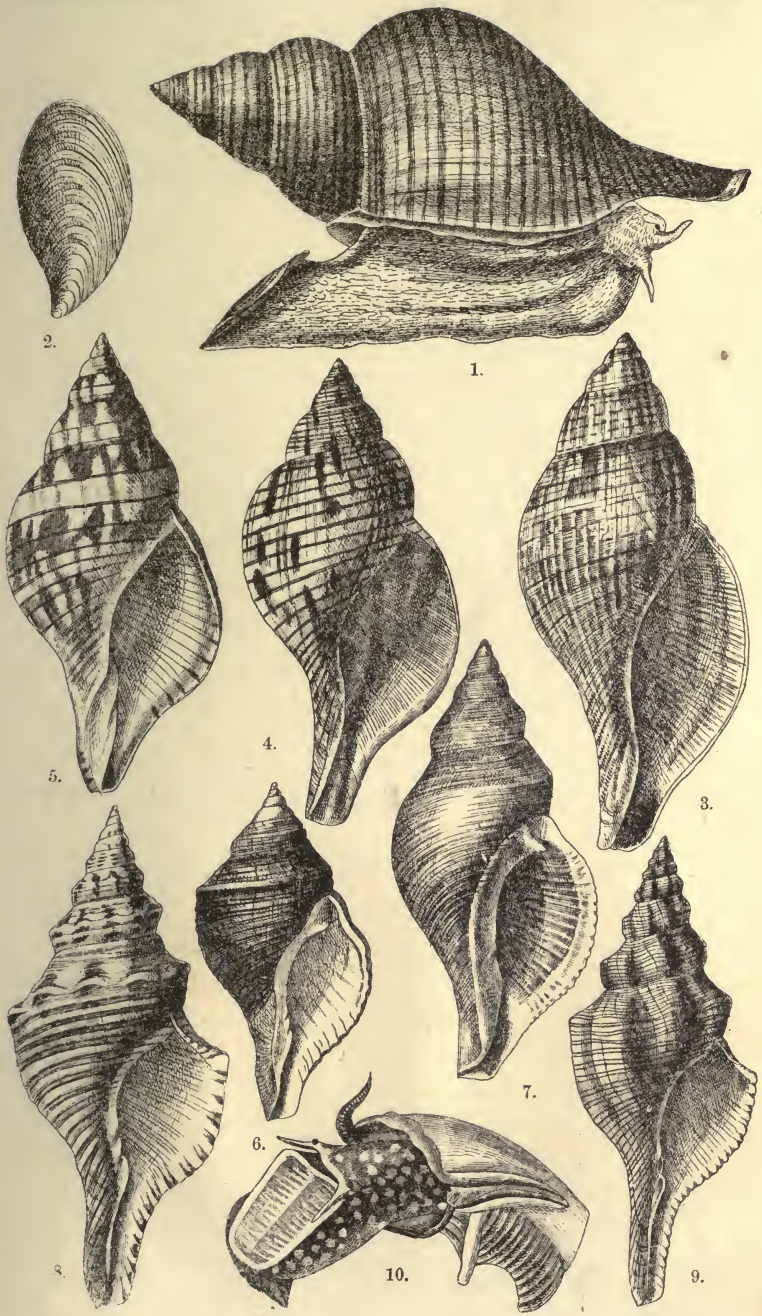
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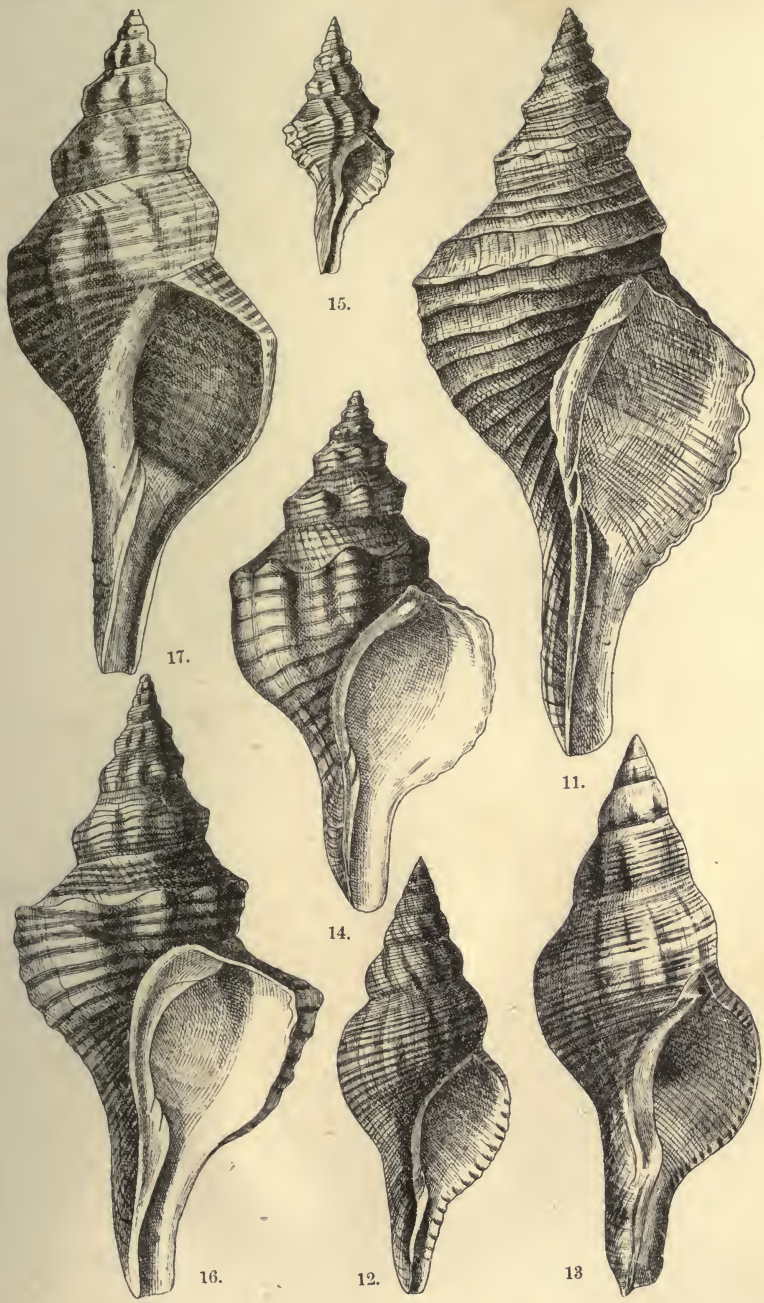
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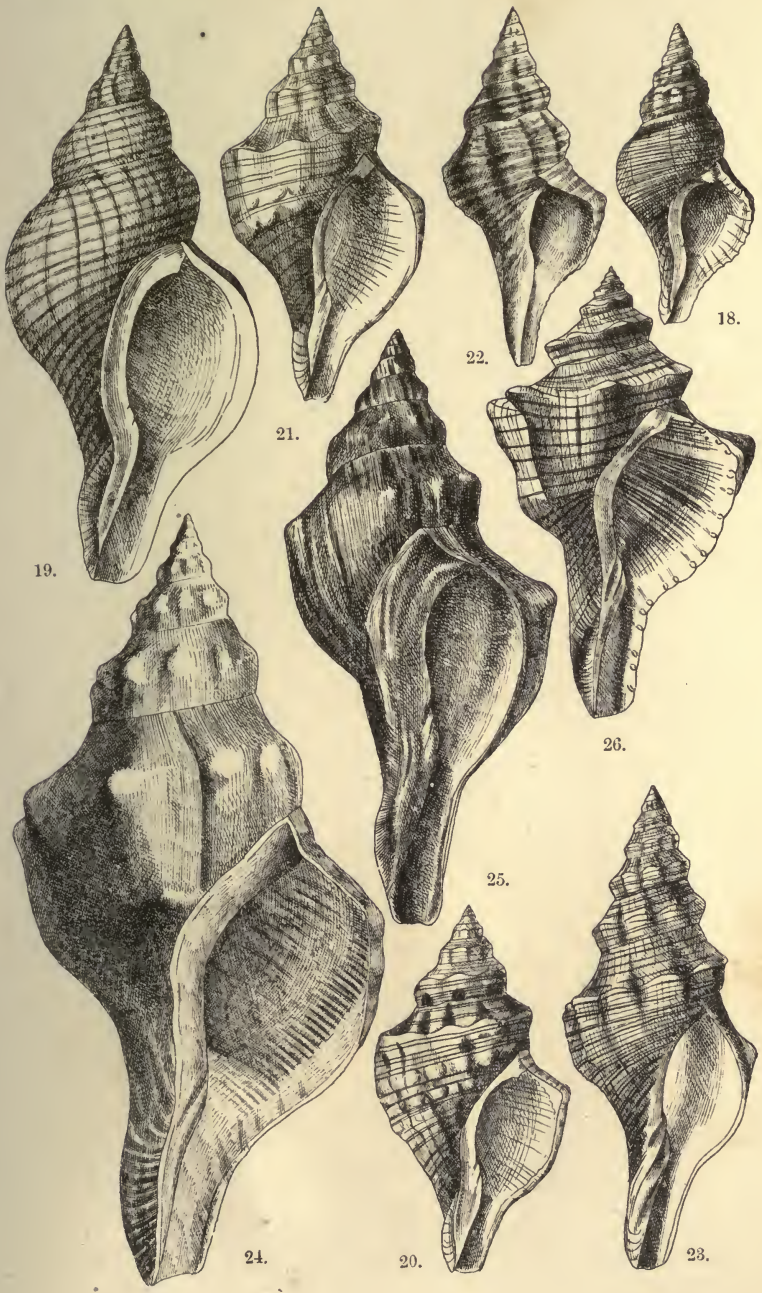
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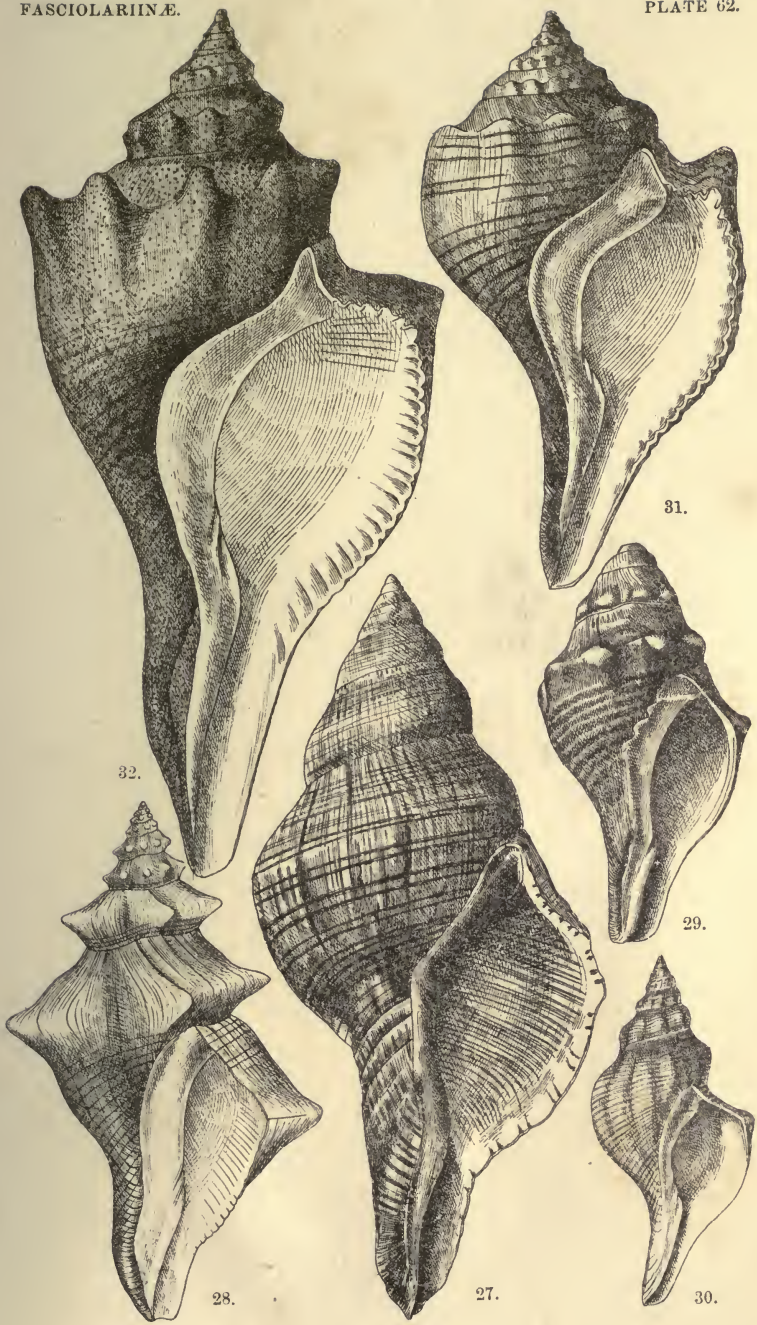

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34.

Dr. Jeffreys has narrowed his conception of the species in this instance to suit the British specimens which are, as he says, glabrous, without epidermis or any traces of ribs; the species, however, appears to attain its maximum development in the waters of the Atlantic coast of British America, and it is from these that our description is made. The *ventricosum* of Kiener does not appear to differ. Colored markings are rare upon American specimens—which are almost invariably invested more or less with a very thin epidermis. Our Banks specimens (fig. 348) were wrongly identified by Gould and others with *B. ciliatum*, Fabr., and still are to be found in most of our collections under that name. Stimpson was the first to refer them to *B. Humphreysianum*. Of course, there is hardly sufficient character left in the egg-cases alone to justify the adoption of Jeffreys' suggested generic name *Mada*.

The zebra-like striped variety (*B. ventricosum*, Kiener) is rarely so highly colored as the original figure—which I have copied (fig. 385). *B. fusiforme*, Kiener (fig. 347), is the typical European form (= *glabra*, Jeffreys), and comes from Provence. *B. striatum*, Phil. (fig. 349), a Sicilian fossil, is certainly a very good representation of the typical American form. Among the synonyms are also to be included *B. tumidulum*, Sars (figs. 350, 351), from Norway, and *Tritonium ovum*, Midd., not Turton (fig. 352); and probably *B. Mörchii*, Friele, an unfigured species, notwithstanding the more central nucleus of the operculum, the different number of teeth on the middle and side plates of the lingual, etc.

B. Belcheri, Reeve. Pl. 77, fig. 353.

Oblong-ovate, base truncate, thin, whorls convex, linearly spirally sulcate, aperture ovate, columella arcuate, sub-excavated in front, contorted; livid chestnut within, pellucid; epidermis thin, deciduous.

Port Refuge and *Dobbin Bay, Arctic Am.* (30 fathoms); Finmark.

Like the rest of the genus, this species is subject to great variation. The type specimen is comparatively smooth and without plications beneath the suture; others are strongly plicated, and have the spiral ridging much raised. Dr. J. Gwyn Jeffreys considers it a variety of *B. undatum*.

Spurious, Doubtful and Undetermined Species.

B. Escalæ, Philippi. Pl. 77, fig. 354.

A minute shell, about 5·5 mill. long; white, maculated with rufous. Has the aspect of a *Ricinula* (*Sistrum*).

Coast of Chili.

B. clavula, Menke. *St. Thomas.*
B. Schrœderi, Beck. *India.*
B. Boysii, Nuttall. *California.*
B. Poulsoni, Nuttall. *California.*
B. plicatulum, Nuttall. *Sandwich Isles.*

MSS. names in Jay's Catalogue, 3d edit. They are not to be found in the 4th edition.

The following species are described by Lesson in the Revue Zoologique :—

B. Genetta (*Coast of Oran, Algiers*); B. affinis, "related to and of same form as *B. ovum*, Turt., and *B. fusiforme*, Kiener," *Pacific Ocean;* B. phalæna, Lesson (= *Engina* ?), *Acapulco;* B. floridanum (= *Nassa* ?), *Acapulco;* B. tulipa, *Acapulco;* B. pulicaris, *Sandwich Isles* and *Taheiti.*

B. acuminatum, Menke (? = *Columbella*). *Australia.*
B. fasciculare, Menke. *Australia.*
B. pulchellum, C. B. Ad. *Jamaica, St. Thomas, W. I.*
B. luteolum, Val. (Named but not described.) *Kurile Isles.*
B. leiocheilos, Val. *Acapulco.*
B. succinctum, Powis; B. catenatum, Powis (? = *Columbella*). *Mauritius.*
B. melo, Lesson (? = *Melo*). *New Zealand.*
B. Triton, Lesson. *New Zealand; Callao, Peru.*

Dr. J. E. Gray and Mr. Hutton identify this species with the young of *Siphonalia nodosa*, Mart. The original description assigns New Zealand as habitat, whence it was brought by a vessel stationed in the South Seas; a year afterwards the habitat is corrected to Callao, Peru, where it is said to be very common and eaten by the inhabitants.

B. VINOSUM, Lam. *Australia;* B. ZEBRA and B. TENUIPLICATUM, Lam. *Hab. unknown.* These are not figured and M. Deshayes has failed to recognize them. *B. zebra* may belong to the Cerithiadæ.

B. SECHELLARUM, Dufo.	*Seychelles Isles.*
B. CHILOËNSE, Phil.	*Chili.*
B. CASANI, Maravigna.	*Hab.?*
B. ANTARCTICUM, Phil. (? = *Columbella*).	*Magellan's Straits.*
B. ACTONIS, Phil.	*Magellan's Straits.*

B. SULCATUM, Friele. Pl. 87, fig. 627.

I have a proof figure received in advance of its publication, but no description of this species. Locality probably Spitzbergen.

B. NIVALE, Friele. Pl. 87, figs. 619, 620.

Unpublished: by the author's kindness I am enabled to give copies of the shell and peculiar operculum, taken from a proof copy of a plate. It probably comes from the vicinity of Spitzbergen.

Genus **BUCCINOPSIS**, Jeffreys.

Mr. Jeffreys, who places his genus in the family Muricidæ, remarks that "the principal difference between this genus and *Buccinum* consists in the operculum, the nucleus of which, is in *Buccinopsis* terminal, at the inner base of the mouth, the increase taking place by semielliptical layers; while in the other genus it is placed within the edge, at the outer side of the mouth, the increase taking place by concentric layers. The egg-cases of *Buccinopsis* are separate,* and shaped like a well-filled leather purse, the opening for the egress of the fry being at the top and very wide. According to Mr. Alder, 'its tongue (Pl. 27, fig. 32) differs from that of *Buccinum undatum*, as well as from those of the allied species of the genus *Fusus*, and makes a slight approach to that of *Mangelia*. It has a single plain and slightly curved tooth on each side, and a very thin, non-denticulated plate in the centre.'"

* As in *Buccinum Humphreysianum*.

B. Dalei, Sowb. Pl. 79, figs. 387, 388; Pl. 77, figs. 355, 356.

Shell egg-shaped, with a truncated base, moderately solid, semitransparent, somewhat glossy; sculpture numerous very slight and delicate spiral striæ, and still more close-set lines of growth; these marks are only discernible with a magnifying power, the surface appearing smooth to the naked eye; color ivory-white; epidermis extremely thin, pale yellowish white, with a faint tinge of brown. Length 1·15 in., diam. 1 in.

Animal, body pale yellowish-white, with a faint tinge of flesh color. Egg-cases sometimes deposited on the under side of the maternal shell.

Ireland and Scotland, Norway, Behring's Straits, Sea of Ochotsk.

Dredged 40 to 160 fathoms. Fossil in the Red and Coralline Crag, and Antwerp Crag. A specimen from the latter deposit, in the Brussels Museum, measures 3·75 ins. long by 1·75 ins. in diam. Among the synonyms may be mentioned *B. ovoides*, Middendorff (fig. 355), and *B. ovum*, Turton (fig. 388).

Var. eburnea, Sars. Fig. 356.

Shell smaller and thinner, with the spire more produced.

B. nux, Dall.

Short, very solid, smooth, except for microscopic revolving striæ, with an ivory-like surface, which in young living specimens is covered with a beautifully reticulated, short, velvety epidermis, of a brownish color. The adult shell is white or with a band of livid purple. Suture distinct; spire very short; whorls five, last very much the largest, very rotund. Outer lip thickened, smooth, projecting beyond the columella, whose anterior edge is smoothly and widely twisted, so that a glimpse can be had of the interior axis. Column thickened, short, somewhat arcuated, with no fasciole.

Length 1·28 inches, width ·8 inch.

Aleutian Islands; 10 fathoms, rocky bottom.

Differs from *B. Dalei* in the epidermis, which, in the latter, is smooth and polished, and in the solidity of the shell. I do not know the species.

B. CANALICULATA, Dall.

Shell solid, livid white, covered with a strong, dark brown pilose epidermis; whorls moderately rounded; suture deeply channelled; surface of the whorls covered with fine, spiral, thread-like ridges, with still finer ones intervening between them, lightly decussated by the fine but distinct lines of growth, to which the epidermis especially adheres; the coarser ridges are about seven in number, between the posterior end of the aperture and the edge of the suture behind it. Whorls five and a half, aperture half as long as the shell; internally polished; outer edge somewhat thickened; inner lip callous; columella strongly twisted; canal short, rather wide.

Length 1·33 inches, diam. ·75 inch.

Cape Espenberg, Alaska. (One specimen, on the beach.)

Much less inflated and proportionally longer than *B. Dalei*, which is nearly smooth and has not the channelled suture. I am not acquainted with this species.

Genus **NEOBUCCINUM**, E. A. Smith.

N. EATONI, E. A. Smith. Pl. 77, figs. 357, 358.

Pallid brown; shell thin and smooth. Length, 56 mill.

Kerguelen Island, 3–7 fathoms.

Animal (in spirit) uniform buff color; foot broad in front and somewhat truncated, narrowed posteriorly; head of moderate size, furnished with two rather short tentacles not adjacent at their base; eyes situated on prominences on the outer side of the tentacles towards their bases; proboscis very long; siphonal expansion of the mantle thick, of medium length.

Lingual ribbon very long; rachidian tooth tricuspidate, uncini tricuspidate also, prongs hooked, outer one the largest, the inner rather smaller, the median very much smaller still and close to the latter.

The preceding genera, *Buccinum* and *Buccinopsis*, are inhabitants of the Arctic sea; this, of the Antarctic waters.

Genus **VOLUTHARPA**, Fischer.

This little group of mollusks is confined in distribution to the North Pacific Ocean, its metropolis being Japan. Three of the species were originally described as *Bullia*, from which genus it

differs in its simple foot and in possessing eyes as well as in dentition. The form and porcellanous texture of the shell are like *Bullia*, and serve to separate it from *Buccinum*. Mr. Arthur Adams says that the animal is like *Buccinum*, of a white color sparsely sprinkled with black on the head, foot and siphon; the tentacles are broad, close together at the base, and rather short, with the eyes on the outer side, near the middle; the siphon is thick and short, and the foot is fleshy and simple behind.

With regard to the *Volutharpa ampullacea*, a very remarkable fact may be mentioned. The majority of the individuals are without opercula, even without a trace of the pad-like gland or area from which the operculum is secreted. About ten per cent. of the individuals of the var. *acuminata* which I have examined had traces of this gland or area, marked by its smooth and rather whitish surface on the granulous dark slate-colored foot. About fifteen per cent. had well developed opercula in the proper position. I have ascertained the same to be the case with regard to the typical form, from alcoholic specimens, collected by Dr. William Stimpson in Behring's Strait. There is no mistake about this, strange as it may and must appear, that different individuals of the same species are indifferently operculate or inoperculate.

A careful examination of this appendage reveals some singularities in it worthy of note. At first the operculum is of an ovoid form, with the nucleus near the edge at the larger end, and increases by additions around the edge, but principally upon the smaller or upper end. However, at some late period of its growth it takes a new start, and, seemingly, a new operculum is commenced underneath the old one, with a central nucleus which increases by annular additions, and finally has its edges very much thickened and turned upward, giving it a saucer-like appearance, while the old operculum seems as if laying upon the saucer, with its nucleus and some of the adjacent portion projecting over the edge anteriorly. It has in all a diameter of ·1 inch. That its form is not due to an individual abnormality is evident from the fact that all the specimens examined were similar.*

* W. H. Dall, Am. Jour. Conch., VII, 106.

Mr. Gwyn Jeffreys, in his excellent "British Conchology," records the occurrence, upon the Kentish and Sussex Coasts, of *Buccinum undatum*, having two or three opercula. "In a bi-operculate specimen, procured by Mr. Rich, one of the opercula is conical and borne on a cylindrical, stalk-like lobe, the other being of the usual shape; in a second specimen, one operculum is longitudinally oval, with the nucleus nearly terminal (as in *Fusus*), the fellow operculum being placed at a right angle to it."

"The above facts," says Dr. Paul Fischer,* "modify considerably our confidence in specific and generic characters furnished by the operculum. They at least demonstrate that the absence of an operculum will not suffice for the exclusion of mollusks from families the other genera of which are provided with them."

I have inserted in a former volume of the Manual an account of abnormal opercula observed in *Fusus* and *Pleurotoma*,† and it is well known that some species of the latter genus as well as of the nearly related genus *Conus* are provided with opercula, whilst others have them not. The duplication of opercula in *Buccinum undatum* appears to meet a parallel in the case of the Cephalopod genus *Loligo*, in the duplication of the internal cartilaginous pens or shells.‡

After all, the operculum furnishes generic characters of considerable value in classification; we can by no means afford to dismiss its evidence as unreliable because it sometimes, abnormally, unsettles our long cherished (and perhaps erroneous) convictions of the stability of generic and specific characters.

"The ovicapsules of *Volutharpa* are not at all like those of *Buccinum*, but rather like those of *Busycon* (= *Fulgur*), though smaller, consisting of disk-like capsules, united by one edge to a ribbon or stalk. They contain from eight to twelve embryos, which attain the length of a half inch, and a shell of two whorls, which, except in the absence of epidermis, essentially resembles the adult. The first whorl, however, is whitish and amorphous,

* Jour. de Conch., 114, 1875.

† Vol. II, p. 15.

‡ Manual, I, 141.

and very fragile; it is large for the size of the embryo, and is invariably lost in shells which have attained maturity. The remainder of the embryonic shell is translucent purplish red, or wine-color, with revolving lines. I found the embryos on the point of escaping from the ovicapsules in September. The disks of the capsules are three-quarters of an inch in diameter and two-tenths of an inch thick, with the edges perpendicular to the top and bottom, and the angles serrate or furnished with slight coriaceous projecting points.*

V. PERRYI, Jay. Pl. 79, fig. 389.

Shell ovately globulose, rather thin, inflated towards the base, spire short, acute, sutures impressed, whorls smooth, color yellowish ash, interior of aperture rusty brown.

Bay of Yedo, Japan.

V. AMPULLACEA, Midd. Pl. 77, figs. 359, 360; Pl. 79, fig. 390.

Reddish brown under a rufous or yellowish epidermis.

Length, 22 mill.

Japan, Sitka; Sea of Ochotsk, etc.

V. DESHAYESIANA, Fischer (fig. 390), is generally considered specifically identical.

Mr. Dall has described a var. *acuminata*, from Sitka; it has a narrower, less rounded form, with a thicker and stronger, almost pilose epidermis.

In perfect, fresh specimens of the typical form the thin "epidermis is covered with minute, very short cilia, caused by the elevation of minute threads of the epidermis at the intersection of the crowded fine revolving striæ which cover the whorl, with the lines of growth. In some apparently perfect specimens, however, the epidermis appears perfectly smooth and even polished."†

It is very doubtful whether *V. Perryi*, Jay, is distinct from this species; no dimensions are given, but the figure is considerably larger. I do not detect any other difference between them than that of size.

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* W. H. Dall, Am. Jour. Conch., VII, 106.

† Dall, Am. Jour. Conch., VII, 104.

V. Fischeriana, A. Ad.

An unfigured species said to be "intermediate in form between *V. ampullacea*, Midd., and *V. Perryi*, Jay. It is a thinner and smaller shell, with a hispid epidermis, the short hairs being arranged in close-set cross rows, giving the surface a reticulated appearance." Length, 1 inch, diam., 11 lin.

Korea Strait, South Japan.

Unfigured. Probably not distinct from *Ampullacea*.

V. Limnæana, A. Adams.

This name is in the list of species of *Bullia* in the Genera of Recent Mollusca, and is mentioned subsequently as a *Volutharpa* in Ann. Mag. N. Hist., 1860. I do not find any description of it.

V. Mörchiana, Fischer.

This is believed to be synonymous with *Buccinum cyaneum*, Brug.

Genus **CHLANIDOTA**, Martens.

C. vestita, Martens. Pl. 79, fig. 391.

Epidermis yellowish brown; shell white. Length, 23 mill.

Kerguelen Island.

Genus **COMINELLA**, Gray.

Kobelt has recently published a systematic catalogue of the species of this genus, in which they are carefully arranged in accordance with their inter-relationships. I have followed it; merely reducing the number of species which he admits, and adding a few which appear to have escaped his notice. The genus is confined in its distribution to the Southern hemisphere, the metropolis of the typical species being New Zealand; although a few are found at the Cape of Good Hope, etc. Martens' subgenus *Chlanidota* does not appear to me to be very closely related to *Cominella*, and I have preferred to treat that shell as a genus. Kobelt includes the species of *Amphissa*, but the thickening and dentition of the outer lip, the absence of the posterior constriction and general facies, as well as lingual ribbon, indicate a closer relationship with *Columbella*. I have

included as a subgenus Tenison-Woods' new genus *Josepha*, although its principal character, the plait on the columella, appears to ally it to *Phos.* also.

C. PORCATA, Gmelin. Pl. 80, figs. 392, 396, 399, 404.

Yellowish brown; aperture white, tinged with brown.

Length, 2 inches.

New Zealand; Cape of Good Hope.

C. ligata, Lam. (fig. 393), is a synonym.

C. Anglicana, Lam. (fig. 394), is called a variety by Kobelt, but is scarcely entitled to be so considered.

Var. TIGRINA, Kiener. Fig. 396.

Sutural and shoulder ridges usually broken up into granules; surface usually spotted or flamed with darker brown.

Length, 1·25–1·5 inches.

C. pubescens, Küster (fig. 395), is the same; as are also *C. robusta* (fig. 399) and *C. biserialis*, Küster (fig. 404).

C. LIMBOSA, Lam. Pl. 80, figs. 397, 398, 400, 403.

Spire shorter, shell consequently more globose than *C. porcata*. Yellowish to chestnut-brown, the revolving ribs whitish, maculated with chestnut-brown; sometimes unicolored with revolving ribs or simply fine striæ. Length, 1·25–1·75 inches.

Cape of Good Hope.

I fear that this will prove to be a well-marked variety only of *C. porcata*. Typically the color is uniform dark brown; without ribs (fig. 400).

Var. LAGENARIA, Lam. Figs. 400, 403.

Shell with revolving ribs, which are usually white, spotted with chestnut. It is related to *C. limbosa* in much the same manner that *tigrina* is to *porcata*.

Kiener's *C. lagenaria* (fig. 94*a*), which Kobelt refers to *dubia*, Krauss, as a species of *Cominella* following *lagenaria*, represents a species of *Purpura* (*P. scobina*, Quoy., Vol. II, 170, t. 52, f. 127).

C. PAPYRACEA, Brug. Pl. 80, figs. 401, 402.

Thin, with close revolving striæ; suture somewhat channelled, concave shoulder of whorls obsolete or barely perceptible. Light

reddish brown or white under a very thin yellowish brown epidermis. Length, 1·5–1·75 inches.

Cape of Good Hope; Natal.

C. intincta, Reeve (fig. 402), is a synonym. *C. robusta*, Küster, which Kobelt makes a variety = the Anglicana form of *C. porcata*.

C. Zeyheri, Krauss. Pl. 80, figs. 406, 406.

This is considered a distinct species by Kobelt, but the specimens figured are evidently immature shells, the first, of *C. limbosa*, perhaps; the second, of *C. porcata*. The first figure is certainly a bad drawing, because it does not show any subsutural depression of the whorls although the description mentions it.

Length, ·6 inch.

Cape of Good Hope.

C. Dunkeri, Küster. Pl. 80, figs. 408, 409, 407.

Whitish with chestnut revolving liræ, or flames and strigations. Length, ·5–·6 inches.

Cape of Good Hope.

Another immature shell, described as a *Fusus*, and by Küster placed in *Buccinum;* where, the specific name being pre-occupied by Lamarck, he calls it *B. Dunkeri* (figs. 408, 409). It is a doubtful species; even its pertinence to the genus is problematical, as well as the identity of Küster's shell with that of Dunker. Schrenck reports it from the Bay of Hakodadi, but certainly has mistaken the species.

C. violacea, Quoy. Pl. 80, figs. 410, 412.

Brown, with violet revolving lines. Length, 1·5 inch.

Cape of Good Hope.

C. Delalandi, Kiener. Pl. 80, fig. 413.

Ash-color, with waved longitudinal brown markings Fine revolving striæ. Epidermis greenish. Aperture light chocolate. Length, 1·5 inch.

Cape of Good Hope.

In form it is very close to *C. lineolata*, Quoy.

C. testudinea, Martyn. Pl. 80, figs. 414, 415.

Ash-color, tessellated or flamed with chocolate-brown; lip margin and columella yellowish brown, becoming bluish or choc-

olate within the aperture. With obsolete revolving ribs; surface frequently irregularly pitted. Length, 1·25 to 1·5 inches.

New Zealand.

C. cataracta, Chemn. (fig. 415), is a mere color-variety of this species. Kobelt quotes as a variety *C. lineolata*, Lam., (not of Quoy nor Reeve,) but I think Lamarck's species is the same as that which those authors have figured for it.

C. MACULATA, Martyn. Pl. 81, figs. 421–424.

Yellowish grey with revolving lines of chocolate-brown spots; aperture yellowish; epidermis chocolate color.

Length, 1·75 to 2·25 inches.

New Zealand.

A heavy, widely oval shell, with a strong callous deposit on the upper part of the columella. *C. testudinea*, Lam. (fig. 422), is a synonym; *C. maculosa*, Mart. (fig. 423), is probably a young individual, and I am inclined to believe that *C. Woldemarii*, Kiener (fig. 424), is also a immature specimen, as the rude growth often causes irregular nodules on the shoulder, at the rest-periods.

C. QUOYI, Kiener. Pl. 80, fig. 418.

Spire plicate, surface covered by numerous revolving striæ; reddish brown, yellowish brown within the aperture.

Length, 1·5 inch.

New Zealand.

I am unacquainted with this species, of which, I believe, only one specimen is recorded, in the Museum at Paris.

C. LINEOLATA, Lam. Pl. 80, figs. 416, 417, 419, 420; Pl. 81, figs. 425–429.

Shell with turrited, long pointed spire, the whorls of which are more or less coronated on the shoulder by the commencement there of longitudinal ribs: ribs sometimes obsolete. Body whorl not ribbed, with a concave shoulder. Yellowish or reddish brown or grey, with interrupted brown bands; aperture yellowish or purple, with numerous deep purple revolving lines, or sometimes white raised revolving lines. Length, 1 to 1·5 inches.

New Zealand.

Kobelt considers *lineolata*, Lam., a variety of *testudinea*, Mart., and therefore separates from it *lineolata* of Quoy and of Kiener

(in part), whilst *lineolata* of Reeve he considers a distinct species. I unite the three, finding the surface painting inconstant, and consider them very distinct from *C. testudinea:* the latter being much wider, with less exserted spire and without ribs. *C. alveolata*, Kiener (fig. 420), has sometimes incised revolving lines, between which the revolving dark spots take the form of oblong tesselations; but these lines are frequently absent, and the markings vary all the way to uninterrupted bands.

Var. VIRGATA, H. and A. Adams. Figs. 417, 425–429.

Revolving lines continuous; surface occasionally with longitudinal brown flammules.

Name proposed for *C. lineolata*, Quoy (fig. 425), supposed to be a different species from that of Lamarck. Reeve proposed the name *C. Quoyi* (fig. 419), at an earlier date for the same form in the event of its proving distinct. I do not use Reeve's name for the variety, because it had already been used by Kiener. *C. obscura*, Reeve (fig. 426), is a slow-growing, thicker form, in which the revolving bands occasionally become slightly elevated above the surface. *C. pluriannulata*, Reeve (fig. 427), said to come from Swan River, is also a *virgata;* as well as *C. lineare* (fig. 428), and *C. lactea*, Reeve (fig. 429).

C. COSTATA, Quoy. Pl. 81, figs. 430–434, 438.

Yellowish brown or ash color, tessellated with revolving series of reddish brown oblong spots sometimes confluent into lines. Ribbed on the shoulder of all the whorls, with incised revolving lines. Lip and columella fawn color, aperture with revolving raised lines. Length, 1 to 1·25 inches.

So. Australia.

A very variable species, differing from forms of *C. lineolata* only in the ribs being developed on the body-whorl: more extensive collections may prove that this is not only synonymous with that species, but that the two following species (*C. acutinodosa* and *filicea*) should be referred to it also. The list of synonyms is already sufficiently extensive: *C. Angasi*, Crosse (fig. 432), *C. Adelaidensis*, Crosse (fig. 433), *C. eburnea*, Reeve (fig. 434), which is a whitish variety, and *C. funerea*, Gld. (fig. 438), which partially connects this species with *acutinodosa.*

C. Quoyana, A. Ad., an unfigured species, has no distinctive characteristics in its diagnosis: Kobelt changes the name to *Huttoni*, on account of *C. Quoyi*, Kiener.

C. ACUTINODOSA, Reeve. Pl. 81, figs. 435–437, 439.

Shell with close revolving grooves, whitish or ash-color, with interrupted chocolate bands or series of spots; aperture closely chocolate banded within. Length, 1 inch.

So. Australia; New Zealand.

Perhaps only a short variety of *C. costata*. Apparently *C. Glandiforme*, Reeve (fig. 436), *C. Zealandica*, Jacq. (fig. 437), and *C. lurida*, Phil. (fig. 439), are synonyms.

C. FILICEA, Crosse. Pl. 81, fig. 440.

Has a proportionally longer spire and less numerous nodules than *C. costata*. Light brown or flesh color, tessellated with chestnut-brown. Length, 16 mill.

Cape York, Australia.

C. CITRINA, Reeve. Pl. 81, fig. 441.

Smooth, pale yellowish orange. Length, 1·4 inches.

Habitat unknown.

This shell looks nearly as much like a *Bullia*, S. G. *Buccinanops*, as a *Cominella*.

C. NASSOIDES, Reeve. Pl. 81, fig. 442.

Orange-brown, ridges and nodules lighter. Length, 1·5 inches.

Habitat unknown.

Compare with next species.

C. NODICINCTA, Martens. Pl. 81, fig. 443.

Light yellowish brown. Length 45, diam. 26 mill.

Auckland Islands.

Martens says that its Antarctic habitat is undoubtedly correct. I fear that it is not distinct from *C. Nassoides*, above.

Unfigured and Doubtful Species.

C. TASMANICA, Tenison-Woods. *Tasmania.*

Distinguished from *C. costata*, Quoy, by being double the size, having distinct raised revolving liræ, no costæ on the last whorl, and being white or greenish, obscurely fasciate. Length, 30 mill.

C. MAURA, A. Adams. *Darnley's Island.*

"This is a blackish brown shell, in some specimens lineated with white; the whorls are constricted just below the sutures, and the upper ones are longitudinally plicate and somewhat eroded."

No dimensions given. Probably a form of *lineolata.*

C. ELONGATA. Dunker. *Hab. unknown.*

C. FUCATA, A. Ad. *Japan.*

C. CROCEA, A. Ad. *Philippines.*

Both these localities are on the authority of labels in the Cumingian Collection, and being distant from the usual range of the genus they may be considered rather doubtful.

C. ALBOLIRATA, C. TENUICOSTATA, Tenison-Woods. *Tasmania.*

Subgenus **Josepha**, Tenison-Woods.

Founded upon the following species, which differs from *Cominella* in possessing a plait upon the columella. If it is really distinct from *Cominella*, why is it not a *Phos?*

C. TASMANICA, Tenison-Woods.

Ovately fusiform, small, solid, opaque, flesh color and white; whorls, including the nucleus 7, convex, angular, regularly and neatly striate, striæ distant and passing over the ribs, which are raised, rounded, and interrupted above by a conspicuous groove; nucleus of two whorls, smooth, inflated; aperture ovate, attenuate posteriorly; labrum thin, acute, columella conspicuously uniplicate, canaliculate behind; base concave, spirally lirate.

Length, 10, diam. 4·5 mill.

Tasmania.

Unfigured. I have not seen it.

Genus **CLEA**, A. Adams.

First proposed as a genus of the family *Melanidæ*, which the shell resembles in its form, epidermis and habitat in fresh waters, especially reminding one of the genus *Hemisinus.* The operculum with its apical nucleus, no less than the lingual dentition, whereof the formula is 1·1·1 in *Clea*, instead of 3·1·3 as in *Melania*, induced Brot to remove the species to *Buccinidæ;* and really

the form and sculpture of the shell do not contravene such a disposition of *Clea*, its fluviatile distribution being actually the strongest argument for considering it a *Melania*. As to the genus *Canidea*, the differential characters are slight and of specific value only, except that the margin of the aperture is sinuated in front in all the species, and this may serve as a convenient means of dividing the genus *Clea* into two groups, one of which may bear the name of *Canidea* as a subgenus. The differences in operculum and dentition pointed out by Brot are unimportant. The geographical distribution of the genus comprises the Malaysian Peninsula and Archipelago. It would be interesting to ascertain whether the waters inhabited are really fresh, or perhaps brackish.

For the species, I follow the monograph by Dr. A. Brot, published in the "Journal de Conchyliologie," 1876.

C. NIGRICANS, A. Adams. Pl. 81, figs. 445, 446.

Epidermis dark olive, aperture light chocolate. Length, 28 mill.

Sarawak, Borneo.

C. funesta, A. Adams, an unfigured species from Malacca, does not appear to differ specifically, judging from the description.

Subgenus **Canidia**, A. Ad.

C. HELENA, Meder. Pl. 81, figs. 447, 448.

Yellowish olive, with two chestnut bands. Length, 20 mill.

Java.

I do not find any good characters by which to separate *C. Theminckiana*, Petit (fig. 448), an immature shell.

C. TENUICOSTATA, Brot. Pl. 81, fig. 449.

Brown, without bands. Length, 21 mill.

Pexabury, Siam.

Perhaps a variety of *C. Helena*.

C. BAUDONIANA, Mabille and Le Mesle. Pl. 81, fig. 450.

Yellowish olive, the bands chestnut-brown. Length, 30 mill.

Houdong, Cambodia.

With a longer spire than *C. Helena*, and three bands, this may still be only a variety of it.

C. FUSIFORMIS, Deshayes. Pl. 81, figs. 457, 458.

Straw color, with three orange bands.

Cambodia.

Another possible variety of *C. Helena*.

C. BOCOURTI, Brot. Pl. 81, fig. 459.

Light corneous, with from one to five brown bands. Length, 22 mill.

Pexabury, Siam.

The ribs are more distant than in the preceding species. There is a slight shoulder, the further development of which might run the species into *C. scalarina*.

C. CAMBOJIENSIS, Reeve. Pl. 81, figs. 451, 452.

Straw-colored or greenish olive. Length, ·75–1 inch.

Cambodia.

C. SCALARINA, Deshayes. Pl. 81, fig. 453.

Orange-brown. Length, 12 mill.

Cambodia.

C. JULLIENI, Deshayes. Pl. 81, figs. 454–456.

Yellowish white, with three usually broad chocolate bands. Length, 16–24 mill.

Cambodia.

C. bizonata, Desh. (fig. 455), does not differ, and *C. Broti*, Desh. (fig. 456), is a variety in which the spire is more depressed, making the form more globose, with the longitudinal ribs merely rudimentary.

C. ANNESLEYII, Benson. *Quilon, Malabar.*

C. FUSCA, H. Adams. *Cambodia.*

I cannot attempt the identification of these two unfigured species.

Sub-Family EBURNINÆ.

Genus **EBURNA**, Lam.

The Eburnæ comprise a small, very well defined group of about a dozen species, the generic character being unmistakable in all of them. The whorls have more or less shoulder; those of *E. Zeylandica* showing the least, being a mere slight flattening of the contour next below the sutures, whilst in *E. spirata* there is

a regular channel out of which arises the preceding whorl: The species are all largely umbilicate, but in some of them the umbilicus is covered or filled, more or less completely by the callous inner lip: the umbilical region is defined by a strong rib. A thin, dark brown epidermis, sometimes translucent, covers the living shell, but cabinet specimens are usually denuded of this, exhibiting upon an ivory-white surface, spots and maculations of orange-red. The aperture is usually white, sometimes tinged with violet upon the columella. This pattern of coloring is most uniform throughout the genus; but the species are distinguished by modifications of the arrangement of these color spots, as well as by the differences of shoulder and umbilicus. None of the species are strictly banded, although in some the coloring coalesces into irregular revolving masses. The coloring reminds one strongly of *Phasianella*,* whilst the shell, except for the want of its characteristic groove and tooth recalls the genus *Pseudoliva*—one of the species of which was formerly erroneously referred to this group. The surface of the shell is invariably smooth, devoid of the sculpture of ribs, striæ, tuberculations, etc. The operculum is ample, filling the aperture. The Eburnæ are natives of the tropical seas of the Eastern hemisphere.

If we observe the rule of taking the first species as the type of a genus, *Eburna*, Lamarck must become a synonym of *Ancillaria*, his first species being *A. glabrata:* Lamarck's assemblage of species, however, clearly indicate his intention. Naturalists have done much to render science and themselves contemptible by expending their time upon the nomenclature, instead of the structure and habits of animals. *Eburna*, Lamarck is well understood and will answer my purpose.

I commence with those species showing the least shoulder, ending with those in which it is most strongly defined. My illustrations are mainly derived from Sowerby's Thesaurus Conchyliorum: Reeve has also monographed the genus is his Conchologia Iconica.

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* Or of the *ecclesiastical* group of Mitræ, such as *M episcopalis, pontificalis, papalis, cardinalis,* etc.

E. PAPILLARIS, Sowerby. Pl. 82, fig. 460.

Surface covered with small spots; shoulder scarcely angulated; umbilical region narrow, covered. Length, 1·75 inches.

Cape of Good Hope.

A rare species.

E. ZEYLANICA, Brug. Pl. 82, figs. 461, 462.

Painted with oblique blotches below the sutures, and in a revolving series near the base; other spots smaller; shoulder rounded, scarcely apparent; umbilicus open, its margin sometimes tuberculated and tinged with violet.

Length, 2–2·75 inches.

Ceylon.

E. JAPONICA, Sowb. Pl. 82, fig. 463.

Shorter than *E. Zeylanica*, with narrower umbilicus; the painting of the same pattern, but the spots much smaller and more numerous. Length, 2–2·5 inches.

Japan.

Mr. Arthur Adams has described the animal of this species.* He says: The tentacles are ringed with red brown, and speckled with light yellow; and the siphon is spotted with yellowish white, and irregularly banded with red brown lines. The foot (long, large, thick, and fleshy, like that of *Buccinum*), is transversely banded with irregular red brown lines and minutely spotted with pale yellow. The sole is also edged with pale yellow. At the caudal extremity of the foot there is a single conspicuous cylindrical terminal filament. He obtained living specimens from 35 fathoms, off Tsu-saki, in Japan.

E. FORMOSÆ, Sowb. Pl. 82, fig. 475.

Coloring, large brown blotches, more or less confluent into longitudinal zigzag markings; no spots. Length, 1·5 inches.

Island of Formosa.

E. LUTOSA, Lam. Pl. 82, fig. 465.

Blotches of color pale and irregular, rarely in spots, usually arranged in an upper broad, and two inferior and narrower revolving series, separated by narrow white spaces. The epidermis, usually orange-brown, is more persistent upon this than on any other species except *E. spirata*. Length, 2–2·5 inches.

China.

* Ann. Mag. N. Hist., 3. ser., xiii, 1864.

E. AREOLATA, Lam. Pl. 82, fig. 476; Pl. 83, fig. 525.

Shell thinner than *E. lutosa*, with shoulder more marked and slightly channelled; umbilicus wider, open; same pattern of markings as *E. lutosa*, but color much darker, blotches more regular, quadrangular, the three revolving series more widely separated by intervening white spaces.

Length, 2·25–3·5 inches.

Ceylon; China Sea, 14 fathoms.

E. spirata, Linn., included this species, as well as the one which now bears that name. Lamarck separated and defined the two forms.

E. SPIRATA, Lam. Pl. 82, figs. 466–468; Pl. 84, fig. 526.

Shoulder sharp-edged, deeply channelled; umbilicus narrow, perforated or closed; epidermis frequently adhering, dark brown; coloring a well-defined series of blotches superiorly, below which are numerous, rather large transverse or oblique oval spots; some of the latter frequently become confluent into an inferior revolving series of irregular or cuneiform markings.

Length, 2–3 inches.

Ceylon; Philippines.

E. CHRYSOSTOMA, Sowb. Pl. 82, fig. 469.

The blotches and spots are both smaller and more numerous than in *E. spirata*, the form is more oval, the coloring brighter, including a carneous aperture and columella.

Ceylon.

I separate this from *E. spirata* with some hesitation. Sowerby considers his Fig. 3 of *E. spirata* to represent this species; it has the coloration, but the form and markings are of the charcteristic *spirata* pattern. Perhaps it would be better regarded as a variety of *spirata*.

E. BORNEENSIS, Sowb. Pl. 82, fig. 464.

Spots large, dark chestnut, distributed over the surface with no arrangement into revolving series. Length, 2 inches.

Borneo.

Peculiar in the coloring and leopard-like arrangement of the spots.

E. SEMIPICTA, Sowb. Pl. 82, fig. 470.

Epidermis yellowish. The two-banded arrangement of the spots and absence of superior row of blotches will serve to distinguish this species. Length, 1·7 inches.

Habitat unknown.

E. PERFORATA, Sowb. Pl. 82, fig. 471.

The deep, wide channel, short rounded whorls, turbinate spire, very wide umbilicus, with tuberculate margin and central callus deposit, and above all the peculiar zebra-like coloring, will serve to distinguish this species. Length, 2 inches.

Habitat unknown.

E. AMBULACRUM, Sowb. Pl. 82, fig. 472.

Very deeply channelled, with short whorls, somewhat flattened upon the upper half; color darker than in the other species in consequence of the color blotches and spots nearly covering the entire surface. Length, 1·5 inch.

Island of Mindanao, Philippines.

E. VALENTINIANA, Swains. Pl. 82, fig. 473.

Shell ovate-globose, heavy, shoulder channelled; spire very short; umbilicus narrow, covered with callus. Color like that of *E. spirata*. Length, 1·75 to 2·25 inches.

Persian Gulf; Red Sea.

Von Martens considers this merely a short form of *E. spirata*, and it is quite possible that such is the case, although the three figures which he gives I would refer without doubt to *Valentiniana*. I cannot adopt the Chemnitzian name *Molliana*, because he was not a binomial author.

Subgenus **ZEMIRA**, H. and A. Adams.

The revolving channel near the base of the shell, ending in a tooth-like projection on the outer lip, has induced Sowerby to class this species in the genus *Pseudoliva:* it seems nearly related to *Eburna*, however.

E. AUSTRALIS, Sowb. Pl. 82, fig. 474.

Shell covered by revolving incised lines; epidermis very thin, yellowish; irregularly brown spotted, spots usually more prominent on the shoulder border. Length, ·66 inch.

Port Jackson, Australia; 10 fathoms.

Genus **MACRON**, H. and A. Adams.

This was originally described as a subgenus of *Pseudoliva*, which it resembles in having an inferior revolving groove terminating in a small tooth-like projection of the outer lip; the operculum, however, is unguiculate like that of the Eburnæ, whilst that of *Pseudoliva* is purpuroid. The more decided canal and absence of sutural channel, and the rather persistent blackish brown epidermis, will distinguish it from the subgenus *Zemira* of *Eburna*. Its locality, West Coast of North America, is also a distinctive character; *Eburna* being East Indian, and *Pseudoliva* African in distribution. The species are partly included in Sowerby's monograph of *Pseudoliva* in Thesaurus Conch., Vol. III.

M. Kellettii, A. Adams. Pl. 82, fig. 477.

Epidermis blackish or dark brown, under which the shell is white. Whorls partially or entirely encircled with low, broad, rounded ribs, sometimes only apparent on the lower part of the body whorl, sometimes obsolete. Length, 1·75 to 3 inches.

San Diego, Cal.; Gulf of California.

Buccinum Æthiops, Reeve, has been confounded with this species, but is a very different shell, entirely distinct in its overhanging ribs, broad flat shoulder, want of tooth on the lip, etc.; in fact is a synonym of *Purpura cingulata*, Linn. *M. Kellettii*, Hinds, belongs to the genus *Siphonalia*.

M. livida, A. Adams. Pl. 82, fig. 478.

Epidermis dark brown, whitish or livid beneath; surface smooth except several incised striæ near the base.

Length, 20 mill.

San Diego, Cal.; Todas Santos Bay, L. Cal.

Mr. Stearns thinks this will prove to be a small form of *M. Kellettii*, dwarfed by reason of its northern habitat. Its perfect growth, narrower form, much smaller size, and thick lip indicate to me adult specimens of a distinct species.

M. Wrightii, H. Ad. *Coast of Patagonia.*

M. commoda, H. and A. Ad. *Hab. unknown.*

Neither of these species has been figured.

Sub-Family PHOTINÆ.

Genus **PHOS**, Montfort.

The animal of *Phos* has a small head, with the tentacles approximating or connate at their base, and eyes near their tips; foot dilated, forming an auriculate, shield-like lobe in front, and terminating behind in a long, tapering filament.

The species of *Phos* bear some resemblance to *Nassa*, and were originally placed in the family Nassidæ; from which, however, they are distinguished by certain good conchological and malacological characters. The turreted form, cancellated surface and grooved interior of aperture are common to *Nassa* also, but the oblique basal fold of the columella is characteristic of this genus. The animal differs from *Buccinum* in the foot, ending in a filament behind: *Nassa* has a bifid posterior termination. The genus is widely diffused, the species however, as far as known, being rather local in distribution. *Phos* has been monographed by Sowerby in Thesaurus Conchyliorum, Vol. III. An inspection of his plates suggests the probable identity of many of the species there figured as distinct. No allowance is made by most describers for individual variation in form, sculpture and coloring; yet, where a number of specimens of a species from a single locality are compared, there will usually be found to exist much difference in the number and prominence of ribs and striæ, coloring, etc. Even the angulated (or shouldered) body whorl appears to be a variable character; some specimens of a single lot of *P. Guadaloupensis* being broadly shouldered as described; others entirely without shoulder or angulation. I am convinced that Mörch's subgenus *Strongylocera*, comprising the species with angulated whorls has no title to distinction, and I have suppressed it accordingly. I have allowed some species to stand provisionally which, judging from the ascertained range of variation in other forms, will probably eventually be considered synonyms.

*** *Oriental Species.*

Ph. senticosus, Linn. Pl. 83, figs. 479–490, 492, 493, 506, 575.

White to chocolate brown, with or without yellowish or reddish brown bands. Length, 1–2 inches.

Philippines; New Caledonia; Amboina; Andaman Isles.

I am compelled to refer to this form a considerable number of species which do not appear to me to have distinctive characters: I have figured them all, however, and those who suppose that I am too conservative, will be able thereby to form their own conclusions. *P. muricatulus*, Gould (fig. 484), from *Japan; P. angulatus*, Sowb. (fig. 485), *Philippine Isles; P. scalaroides*, A. Ad. (fig. 486), habitat unknown; *P. filosus*, A. Ad. (fig. 487), habitat unknown; *Ph. ligatus*, A. Ad. (fig. 488), habitat unknown; *P. plicatus*, A. Ad. (fig. 489), from *Eastern Seas; P. rufofasciatus*, A. Ad. (fig. 490), *Philippines; P. fasciatus*, A. Ad. (fig. 575), *Philippines; P. textilis*, A. Ad. (figs. 492, 493), *Philippines: P. nodicostatus*, A. Ad. (fig. 506), *Philippines.*

Ph. Adamsi, Petit. Pl. 83, fig. 491.

Whitish, obscurely fasciated with brown; regularly cancellated, and prickly nodose. Length, 1 inch.

Habitat unknown.

This appears to be less pyramidal in form, and differs also from *senticosus* in its equally prominent longitudinal and revolving sculpture; still, it may be only a variety. It was described by A. Adams as *P. cancellatus*, which name being preoccupied, Petit changed it to *Ph. Adamsi.*

P. plicosus, Dunker. Pl. 83, figs. 523, 522, 524.

Ribs rather distant, tubercled at the shoulder of the whorls, encircled by close, sharp revolving striæ; white, middle of outer lip and base of shell chestnut-brown. Length, 1·2 inches.

Cape of Good Hope.

The type is badly figured (fig. 523), yet the description identifies it with the subsequently published *P. speciosus*, A. Ad. (fig. 524) and *P. Morrissii*, Dunker (fig. 522). The ribs are somewhat closer and the shoulder angle not so marked as in *P. pallidus*, the revolving striæ are much finer, and the chestnut coloring appears to be a constant distinctive character.

Ph. Cyllenoides, A. Ad. Pl. 83, fig. 497.

Light yellowish brown, with ash-colored revolving bands crossing the ribs. Length, ·5 inch.

Philippines.

Distinguished by its short, angulated form, few and prominent ribs, wide shoulder, etc.

PH. VIRGATUS, Hinds. Pl. 83, fig. 502.

Light yellowish, the ribs crossed by impressed brown lines. Length, 1·5 inches.

Ceylon.

Spire longer than in its allies.

PH. LÆVIGATUS, A. Ad. Pl. 83, fig. 499.

Whitish, tinged with orange or brown. Length, 1·5 inches.

Cape of Good Hope.

The only species devoid of spiral sculpture.

PH. TEXTUM, Gmel. Pl. 83, figs. 498, 500, 501, 503–505, 507.

Shell whitish, the aperture and columella deep orange or brown. Length, 1 inch.

Philippines; Indian Ocean; Andaman Isles.

The richly colored interior is the best character by which to distinguish this species. It has several synonyms: *P. pyrostoma*, Reeve (fig. 501); *P. cancellatus*, Quoy (fig. 498); *P. varians*, Sowb. (figs. 503, 504); *P. spinicostatus*, A. Ad. (fig. 505); *P. Blainvillei*, Desh. (fig. 500). The last name is adopted by Sowerby for this species, although Deshayes himself considers it a synonym of *P. textum* in his edition of Lamarck, published 36 years ago. *P. cyanostoma*, A. Ad. (fig. 507), as illustrated by Sowerby in his "Thesaurus," is also a synonym; but Mr. E. A. Smith says that this is a mistake in identification, the true *cyanostoma* being different. Adams never published a figure.

PH. ROSEATUS, Hinds. Pl. 83, figs. 508–511.

Whorls rounded or scarcely shouldered, the longitudinal ribs small, narrow, rounded. Yellowish, roseate or brown, sometimes three-banded with darker color. Length, 1–1·25 inches.

Philippines; Moluccas; Borneo.

P. Borneensis, Sowb. (fig. 510), of which a single specimen furnished the diagnosis and figure, and *P. varicosus*, Gld. (fig. 511), are synonyms.

PH. TEREBRA, Sowb. Pl. 83. fig. 513.

Narrow, with long spire; yellowish brown, with brown bands; whorls occasionally crossed by rounded varices.

Length, ·75 inch.

Sydney, Australia; Borneo?

Ph. retecosus, Hinds. Pl. 83, fig. 514.

Orange-brown to yellowish white; revolving lines beaded where they cross the low longitudinal rounded ribs; lip of aperture varicosely thickened externally. Length, 1·25 inches.

Ceylon.

Ph. gracilis, Sowb. Pl. 83, fig. 515.

A small, graceful, brown species; narrow and elongated. Length, 20 mill.

Sydney, Australia.

Very like *Ph. Terebra*, Sowb., but without the varices of that species.

*** *American Species.*

Ph. pallidus, Powis. Pl. 83, figs. 494–496.

Whitish, yellowish or fuscous, usually darker between the longitudinal ribs, color sometimes broken up into revolving series of spots (*Ph. notatus*, Sowb., fig. 496). Length, 1 inch.

Panama; Philippines?

A stout, ovate, rugose species, with prominent nodulated shoulder and *Nassa*-like form. *Ph. pallidus* is known to come from Panama, yet it is recorded "Philippines" in Sowerby's Thesaurus. *Ph. notatus* is also "Philippines" in the same work, and I do not think the locality can be correct in either case.

Ph. crassus, Hinds. Pl. 83, fig. 521.

Thick, broad, light brown, more or less banded. Length, 1·5 inches.

Panama.

Ph. articulatus, Hinds. Pl. 83, figs. 516, 517.

Shell long and slender, with small rounded ribs and slight shoulder; yellowish or reddish brown, sometimes with revolving, interrupted, darker bands. Length, 1–1·38 inches.

Panama; coral sand, 6 to 10 fathoms.—Cuming. *West Columbia.*

With this species I unite *Ph. turritus*, A. Ad. (fig. 517).

Ph. gaudens, Hinds. Pl. 83, figs. 518, 519; Pl. 84, figs. 527, 528.

Shell without, or with a slight shoulder; ribs small, few and distant, tuberculated at the crossing of the revolving lines; light yellowish brown, generally with two revolving bands of chocolate interrupted by the ribs. Length, 1–1·25 inches.

Gulf of Tehuantepec, W. Coast of Mexico; W. Columbia.

Hinds described this species from a young shell (fig. 527), which, however, agrees well enough with *Ph. Cumingii*, Reeve (fig. 519). The figures given in Sowerby's Thesaurus (fig. 518, *gaudens*, fig. 528, *Cumingii*), differ somewhat, but evidently belong to the same species. I am very doubtful of the propriety of separating this from *Ph. articulatus*, Hinds; from which typically it differs in the smaller number of ribs.

Ph. Veraguensis, Hinds. Pl. 84, figs. 529–532, 534.

Shell without shoulder, closely covered with narrow, elevated, longitudinal ribs, crossed by narrow, raised revolving lines, forming prickly tubercles at the intersections. Yellowish or brownish, sometimes faintly banded. Length, 1–1·25 inches.

Veragua, W. Coast of Central America; West Indies; Senegal.

I cannot detect any difference between the West Coast and West Indian specimens, and accordingly place in the synonymy the following species from the latter area: *Ph. Antillarum*, Petit (fig. 531) and *Ph. Candei*, d'Orb. (fig. 534). *Ph. Grateloupiana*, Petit (fig. 532), said to come from Senegal, may also be placed here.

Ph. Beauii, Fischer. Pl. 84, fig. 533.

Elongate-conical, with numerous slight longitudinal ribs, and occasional revolving lines; yellowish brown, obsoletely 4–5 banded; whorls occasionally crossed by rounded varices.

Length, 39 mill.

Isle of Marie Galante, W. Indies.

Shell less solid and with much less developed sculpture than the preceding species; the absence of prickly tubercles being the most important differential character.

Ph. Guadeloupensis, Petit. Pl. 83, figs. 520, 512.

Shell broad-ovate, spire conical-turreted; longitudinal ribs terminating in nodules upon the margin of the sloping, usually broad shoulder. White, more or less maculated with brown; aperture stained with brown within. Length, 1 inch.

West Indies; Northern Coast of South America.

A very common species of the Caribbæan province, having much the form of *Ph. pallidus*, Powis, and *Ph. textum*, Gmel. In sculpture and degree of development of shoulder there is

great individual variation. I unite with this species *P. textilinus*, Mörch. *Nassa unicincta*, Say (fig. 512), is an unidentified species which may possibly equal *Guadeloupensis;* if so, it will have priority.

Doubtful and Undetermined Species.

PH. SCULPTILIS, PH. VARICOSUS, A. Ad. Mentioned in H. and A. Adams' Genera, but not described.

PH. CANCELLARE, Menke, PH. DUMALE, Phil. *Marquesas Is.*

PH. FUSOIDES, C. B. Ad. *Panama.*

A single specimen described as a *Triton*, having varices upon the whorls. P. P. Carpenter, who has examined it, says that it is not a *Triton* however, that the aperture has an anterior sinus of the lip, and that it may be an *Euthria*. The lip sinus and other characters, however, agree well enough with *Phos.*

PH. BIPLICATUS, Carpenter. *Panama.*

Not figured; described from a single specimen. The diagnosis fairly applies to *Ph. Veraguensis*, Hinds.

Genus **ENGINA**, Gray.

A group of Columbelloid shells, nodulously, longitudinally ribbed. The dentition of one species, *E. mendicaria*, has been published (Pl. 27, fig. 36), and exhibits the characteristic features of the Photinæ. There must always be some doubt as to identification of species in a case where, like the present one, a single character antagonizes all the others; and, on consideration, I prefer to continue to include *Engina* among the Columbellidæ until the weight of evidence shall be more decisively against it, than it is at present. Even if no mistake has been made, and the lingual examined was that of *E. mendicaria*, it by no means follows that the other species possess similar armature. So decidedly is the shell Columbelloid that to separate the genus on account of the dentition of a single species would be, I think, unphilosophical and undesirable.

Genus **NASSARIA** (Link), H. & A. Adams.

Animal with the tentacles connate at the base; with the eyes near their distal ends; foot anteriorly produced, ending behind in a simple tail without filament.

This genus partakes of the characters of several recognized forms. Its animal, however, differs from that of *Triton* in the approximated tentacles, with the eyes near their ends, and the anteriorly produced foot; from that of *Nassa* in the tail not being bifurcated. In its shell it may be known from *Phos* by its recurved canal; from *Nassa* by its circumscribed inner lip and elongated canal; and from *Triton* by its want of irregular varices.

The first attempt at a monograph of this interesting little genus was made by Mr. Arthur Adams, in the Zool. Proc. for 1853, in connection with the publication of the generic diagnosis. Subsequently, illustrated monographs have been published by Sowerby in his Thesaurus Conchyliorum and by Kobelt in the Conchylien Cabinet of Küster. The few species are all inhabitants of the tropical Asiatic coasts and contiguous seas.

N. NIVEA, Gmel. Pl. 84, figs. 535–538.

Whitish, sometimes with a rosy tinge. Length, 22 mill.

Tranquebar; Singapore; Malacca.

I consider *Triton carduus*, Reeve (fig. 537), a synonym of this species; Kobelt being very much mistaken in referring it to the genus *Trophon*. In *N. multiplicata*, Sowb. (fig. 538), I am also unable to find distinctive characters.

N. SOPHIÆ, Benoit. Manual II, t. 66, f. 381.

Yellowish brown. Length, 34 mill.

Mediterranean, Coralline zone.

A single specimen in the collection of Benoit. I have described and figured this species under *Coralliophila* in Vol. II, p. 211; its generic position being somewhat doubtful. An European conchologist has referred it to *Nassaria nivea*, and there is, of course, a possibility that it is a specimen of that species introduced accidentally into the Mediterranean Sea.

N. ACUMINATA, Reeve. Pl. 84, figs. 539–546, 548.

Whitish, indistinctly fasciate with reddish brown. Length, 39 mill.

China Sea; Indian Ocean.

With this species I unite *N. bitubercularis*, A. Ad. (fig. 541), from the Philippine Islands; *N. suturalis*, A. Ad. (fig. 542), from Malacca; *N. recurva*, Sowb. (fig. 543), from Ceylon; *N. vari-*

cifera, A. Ad. (fig. 544), China Sea, distinguished only by having an occasional varix; *N. nodicostata*, A. Ad. (fig. 545), habitat unknown; *N. Sinensis*, Sowb. (fig. 546), China Sea; *N. turrita*, Sowb. (fig. 548).

N. FUSIFORMIS, Sowb. Pl. 84, fig. 547.

Light reddish, slightly fasciated. Length, 19–26 mill.

China Sea; Malacca.

Kobelt remarks upon the resemblance of *N. turrita*, Sowb. (fig. 548), to *N. fusiformis*, and that the more slender form and higher spire alone distinguish them from *N. nivea:* I think, however, that the resemblance to *N. acuminata* is still more striking.

N. NASSOIDES, Gray. Pl. 84, figs. 549, 550.

Yellowish white, ribs faintly tinged with brown.
Length, 23 mill.

Philippines.

Distinguished from its congeners by the peculiar expansion of the outer lip.

N. MAGNIFICA, Lischke. Pl. 84, figs. 551, 552.

Reddish brown, with one or two white bands. Length, 2 in.

Southern Japan.

I figure, from Kobelt (fig. 552), a non-tuberculate variety of this fine species.

N. EGREGIA, Reeve. Pl. 84, fig. 553.

Yellowish white, ribs crossed by narrow, close, brown bands. Length, 1·4 in.

Isle of Masbate, Philippines; under stones at low water.

Described as a *Triton* and excluded by Kobelt from *Nassaria* and referred to *T. eximius*, Reeve. It is certainly not that species, although possibly a *Triton*. The want of varices and form of the shell certainly indicate close relationship with *N. nivea*.

N. CLATHRATA, Reeve. Pl. 84, fig. 554.

Whitish, apex pale pink. Length, 1·25 in.

Habitat unknown.

I know nothing of this shell. It may be a distorted *Nassaria*, and is equally likely to be a *Coralliophila*. It was described as a *Murex*—which it certainly is not.

N. CURTA, Gould (unfigured). *Port Jackson* (W. Stimpson).

N. PAGODA, Reeve described as a Triton, and referred by Kobelt to this genus, is a true *Nassa* from Panama.

N. ANGICOSTATA. Pease (= *Buccinum farinosum* Gould), is an *Engina*.

N. AMBOYNENSIS, Watson. *Amboyna.*

Not figured. It is said to resemble "*N. acuminata*, Rve., but is shorter, squatter, coarser, with more ribs, is deeper in suture; the canal is shorter, more recurved, and more twisted."

Genus **CYLLENE**, Gray.

The species of *Cyllene* inhabit the intertropical coasts of Africa, the Malaysian Archipelago, etc. They live with the Nassas along shore lines and do not appear to inhabit great depths. The animal which is unknown, is supposed, from the sutural slit which characterizes the shell, to possess a mantle provided with a prolongation or fold occupying this slit, somewhat analogous perhaps, with that of *Oliva*. The operculum of *C. lyrata* is elongated, rhomboidal, with terminal nucleus, externally concave, internally convex.

The genus has been monographed by Sowerby, in his "Thesaurus." Specimens are rare in collections, and the want of material prevents me from proving or disproving the suspicion which I strongly entertain that all the forms described are mere variations of a single protean species. It is certain that neither coloring nor sculpture present reliable characters, and even Sowerby places together ribbed and plain specimens in his *C. plumbea*.

C. LYRATA, Lam. Pl. 84, figs. 555–560.

Whitish, sometimes with interrupted bands, or a single band. Length, ·75 in.

W. Africa.

C. sulcata, A. Ad. (fig. 559), is certainly identical, and *C. unimaculata*, A. Ad. (fig. 560), is merely less sculptured, with a brown spot on the shoulder.

C. LUGUBRIS, Ad. and Reeve. Pl. 84, figs. 561–563.

Yellowish, light brown or chocolate, with sometimes two or three revolving series of reddish brown spots.

Length, ·50–·75 in.

Sooloo Isles; Singapore, 6 fathoms, mud; *Malacca*, 6 fathoms, sand.—Cuming. *W. Africa? Japan.*

C. fuscata, A. Ad. (fig. 562), from Malacca and Singapore, and *C. pallida*, A. Ad. (fig. 563), from W. Africa? are certainly the same. The variation of this type from *C. lyrata*, consists in the smaller, more numerous ribs, and is probably not a good distinctive character.

C. OWENI, Gray. Pl. 84, figs. 564–566.

Yellowish brown, maculated or blotched with red-brown.

Japan; Senegal.

The rather close ribs are not prominent, and are crossed by pretty strong revolving lines, giving a closely cancellated appearance. *C. Senegalensis*, Petit (fig. 566), and *C. Orientalis*, A. Ad. (fig. 565), appear to be synonymous with this form.

C. PULCHELLA, Ad. and Reeve. Pl. 84, figs. 567–571.

Flesh- or ash-color, sometimes banded or spotted in revolving series, or blotched with reddish brown.

Borneo; Japan.

Ribs and revolving striæ both obsolete, except a few impressed revolving lines at base; almost positively a smooth state of *C. lyrata*. I unite with this *C. Grayi*, Reeve (fig. 568), *C. glabrata*, A. Ad. (fig. 569), *C. striata*, A. Ad. (fig. 570), and *C. Guillaini*, Petit (fig. 571).

C. CONCINNA, Soland. Pl. 84, fig. 572.

Fusiform, pale, blotched with brown, smooth. Length, ·5 inch.

Hab. unknown.

Probably only a depauperate form of the last.

C. PLUMBEA, Sowb. Pl. 84, figs. 573, 574.

Chocolate-brown, ribbed or smooth.

Hab. unknown.

Unidentified Species.

C. CHRYSOSTOMA, Meuschen. Mörch, Yoldi Cat.

C. GIBBA, A. Ad. . *Japan.*

C. LACTEA, Ad. and Angas. *New South Wales, Australia.*

C. RUBROLINEATA, Sowb. *Loc. unknown.*

None of the above are figured.

Appendix.

TRITONIDÆ.

EPIDROMUS BEDNALLI, Brazier. P. 32, t. 85, fig. 576.

Through the kindness of Mr. Brazier I am enabled to figure a specimen of this species.

TRITON PHILOMELÆ, Watson. *Nightingale I. Tristao da Cunha.*

RANELLA FIJIENSIS, Watson. *Fiji Islands.*

The first dredged at 100–150 fathoms, the last at 315 fathoms. No figures have been published.

FUSIDÆ.

PERISTERNIINÆ.

Genus MAZZALINA, Conrad. Not characterized. The type appears to be very similar to *Lagena*, Schum., if not identical with that genus. I figure it from the original specimen.

M. PYRULA, Conrad. Pl. 85, fig. 577. Eocene, *Alabama.*

LATIRUS NAGASAKIENSIS, E. A. Smith. Pl. 85, fig. 578. *Japan.*

The large chocolate plicæ are twice the width of the pale intermediate spaces.

LATIRUS (FUSUS) CANALICULATUS, Gray. *China.*

Described as a *Fusus*, but has oblique columellar plaits. It has never been figured, nor mentioned by the monographers, and I suppose that, like many of Gray's species, the type is lost.

Leucozonia cingulata, Lam.

On page 96 I have given Florida as a locality, on the authority of Mr. W. W. Calkins, who informs me that the name is a misprint in his Catalogue; *L. cingulifera* being the species which he intended to mention, as collected there.

Turbinella intermedia, Koch. *Habitat unknown.*

The figure given in Küster is that of a very much water-worn shell, so that its characters cannot be certainly made out; it appears to me to be very like *T. filamentosa*, Koch (t. 69, f. 151). a synonym of *Latirus brevicaudatus*, Reeve.

FUSINÆ.

Luigi Bellardi, in his "Molluschi dei Terreni Terziarii del Piemonte e della Liguria," makes the following fossil genera:—

Genus JANIA, Bellardi. Shell subfusiform; spire elongate; mouth scarcely canaliculate behind; lip marginate, nodose or plicate within; columella uniplicate anteriorly and posteriorly; canal short, recurved.

I. angulosa, Brocchi. Pl. 85, fig. 579.

Genus MAYERIA, Bellardi. Ovate fusiform, spire short, but slightly acute; whorls very sharply carinate in the middle; columella smooth, rather straight in front, canal moderate.

M. acutissima, Bellardi. Pl. 85, fig. 583.

Genus ANURA, Bellardi. Shell turrreted, ovate ventricose; whorls convex; mouth orbicular or suborbicular; lip somewhat arcuate, exteriorly subvaricose in the adult, interiorly margined and smooth; canal scarcely produced; columella slightly contorted, smooth.

A. inflata, Brocchi. Pl. 85, fig. 581.

Genus MITRÆFUSUS, Bellardi. Elongated, mitræform; spire very long and acute; whorls numerous, the last scarcely depressed in front; mouth narrow, long; lip simple; canal long, produced in the axis of the shell.

M. orditus, Bell. et Mich. Pl. 85, fig. 580.

Genus GENEA, Bellardi. Shell subfusiform, long, narrow; spire long, very acute; mouth long, narrow; lip simple; columella smooth, but slightly arcuate; canal very short, wide, straight.

G. Bonellii, Gené. Pl. 85, fig. 582.

FUSUS.

A monograph of this genus has been published by Mr. G. B. Sowerby in the "Thesaurus Conchyliorum," since the appearance of the pages comprising the Fusidæ in the present volume. The "Fusus" of Mr. Sowerby is an assemblage of shells belonging to a number of genera, omitting many species and misinterpreting others, and (inevitable under such circumstances) describing as new, a number of forms which scarcely present sufficient claims to novelty. The figures are superb in their life-like delineation of the shells; indeed, in this respect Mr. Sowerby is without a rival, for to great technical skill he unites a scientific knowledge of the subjects he delineates. I give below the names, localities and copies of the figures of the supposed new species, together with opinions and suggestions concerning them.

F. Percyanus, Sowb. Pl. 85, fig. 586. *Habitat unknown.*

Appears to be a fine *F. polygonoides*, Lam., a very variable species.

F. sandvichensis, Sowb. Pl. 85, fig. 591. *Sandwich Is.*

= *F. spectrum*, Ads. and Reeve, var. *Novæ-Hollandiæ*, Reeve.

F. spiralis, A. Adams. Pl. 85, fig. 593. *New Zealand.*

= *F. spectrum*, Ads. and Reeve.

F. dilectus, A. Ad. Pl. 85, fig. 590. *Habitat unknown.*

= *F. distans*, Lam. (*versicolor*, Gmel. ?), young.

F. lævigatus, Sowb. Pl. 85, fig. 588. *Australia.*

= *F. Australis*, Quoy (*F. marmoratus*, Phil.).

F. rudicostatus, Sowb. Pl. 86, fig. 594. *Australia.*

= *F. Australis*, Quoy (*F. marmoratus*, Phil.).

F. NODICINCTUS, A. Ad. Pl. 86, fig. 595. *Australia.*
= *F. Australis*, Quoy (*F. marmoratus*, Phil.).

F. BIANGULATUS, Desh. Pl. 86, fig. 596. *Habitat unknown.*
= *F. polygonoides*, Lam.

F. SUBQUADRATUS, Sowb. Pl. 86, fig. 597. *Habitat unknown.*
Very close to *F. leptorhynchus*, Tapparone-Canefri.

F. ACUTICOSTATUS, Sowb. Pl. 85, fig. 584. *Habitat unknown.*
Appears to = *F. cælatus*, Reeve.

F. ARTICULATUS, Sowb. Pl. 86, fig. 602. *Habitat unknown.*
= *F. australis*, Quoy (*F. marmoratus*, Phil.).

F. ASSIMILIS, A. Adams. Pl. 86, fig. 601. *Habitat unknown.*
Perhaps a variety of *F. turricula*, Kiener.

F. VULPICOLOR, Sowb. Pl. 85. fig. 585. *Falkland Is.*

F. GRACILIFORMIS, Sowb. Pl. 85, fig. 592. *Japan.*

F. RUBROLINEATUS, Sowb. Pl. 86. fig. 604.
Agulhas Bank, So. Africa.
Evidently an immature shell.

F. REEVEANUS, Petit. Pl. 86, fig. 600. *New Zealand.*
This is not Petit's species, which I have figured under *Siphonalia*, Pl. 56, fig. 383. If the locality of the specimen is correct, it is possibly one of the southern Trophons, allied to *T. Stangeri*, Gray.

F. ROBUSTIOR, Sowb. Pl. 86, fig. 603. *Cape of Good Hope.*
Is allied to *F. ocelliferus*, but has a more distinct shoulder and tubercles. This is one of those species which combines the characters of more than one genus: it may be considered either a *Fusus*, *Hemifusus* or *Siphonalia*.

F. CRENULATUS, Sowb. Pl. 87, fig. 623. *Cape of Good Hope.*
This perhaps, is also a *Siphonalia*.

F. DEPICTUS, Sowb. Pl. 85, fig. 589. *Habitat unknown.*
S. G. *Sinistralia*. A quite young shell: I do not recognize it.

F. ALBINUS, A. Adams. Pl. 86, fig. 599. *W. Africa.*

Very closely allied to, if not identical with, *F. ustulatus*, Reeve.

F. FILOSUS, Schubert and Wagner.

Sowerby remarks that *F. filosus*, Lam., is a *Latirus;* but this is the same species, the plicæ frequently becoming obsolete on the columella of the adult. I have figured it as *Latirus.*

F. EXCAVATUS, Sowb. Pl. 86, fig. 598. *Habitat unknown.*

F. TENUISTRIATUS, Sowb. Pl. 86, fig. 608. *Habitat unknown.*

This is not a *Fusus:* it may be a *Trophon* or *Siphonalia.*

F. FUSCONODOSUS, Sowb. Pl. 86, fig. 605. *Habitat unknown.*

F. LÆTUS, Sowb. Pl. 86, fig. 606. *Habitat unknown.*

F. TESSELLATUS, Sowb. Pl. 86, fig. 607. *Habitat unknown.*

Closely allied species, or three forms of one species.

F. CAUDATUS, Quoy. Pl. 85, fig. 587. *Habitat unknown.*

This does not correspond with Quoy's species (t. 34, f. 119). It is probably immature, and not readily determinable.

MELONGENA.

M. ANGULATA, Sowb. (FUSUS). *Australia.*

= *Melongena pallida*, Brod. and Sowb., p. 109.

Substituted for *Fusus lignarius*, Reeve, preoccupied in that genus. The shell is a Melongena, however, and is a synonym, besides.

M. ANCEPS, A. Ad. (FUSUS). Pl. 87, fig. 609. *Australia.*

Probably a var. of *M. pallida*, Brod. and Sowb., p. 109.

M. PYRULOIDES, DeKay (FUSUS). *N. America.*

Sowerby's figure, which he says is copied from that in the Nat. Hist., of New York, varies in several important particulars: he has evidently tried to improve it from the description. It was found adhering to the bottom of a vessel, and is supposed to have come from the South. Very probably a depauperate *M. corona*, Gmelin, with the spines suppressed.

NEPTUNEA.

N. TORNATA, Gould (FUSUS). Pl. 87, fig. 616. *Massachusetts.*

This is not Gould's species; the latter I have figured (t. 46, f. 261). Is it possibly an extreme form of *N. decemcostata*, Say?

N. INCISA, Gould (FUSUS). Pl. 87, fig. 611. *Northern Seas.*

This also is an erroneous determination. No such shell inhabits our coast. The true *F. incisus*, Gould = *Euthria dira*, Reeve (Pl. 72, fig. 233), and is from New Zealand.

N. TÆNIATA, Sowb. (FUSUS). Pl. 87, fig, 614. *Japan.*

This is probably a var. of *Neptunea despecta*, var. *arthritica*.

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? = C. nigricans, A. Ad. .
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Hyperboreum (Tritonium), Beck. Amtl. Bericht. No. 15.
= Neptunea despecta, Linn.
Hydropanum (Buccinum), Hancock. Ann. Mag. N. Hist. 1. xviii, 325, 1846. = B. cyaneum, Brug.

Idoleum (Pyrula), Jonas. Zool. Proc. 120, 1846, Latiaxis, vol. ii, p. 203.
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Imbricatus (Fusus), E. A. Smith. Jour. Linn. Soc., xii, 540, t. 30, f. 3, 1876. = Coralliophila, vol. ii, p. 209.
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= Strepsidura ficulnea, Lam. (fossil).
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= F. undatus, Gmel.
Incrassatum (Tritonium), Müller. Zool. Dan. 2946. = Nassa.
Inculta (Peristernia), Gould. Bost. Proc. vii, 324, 1866.
? = Leucozonia cingulifera, Lam.
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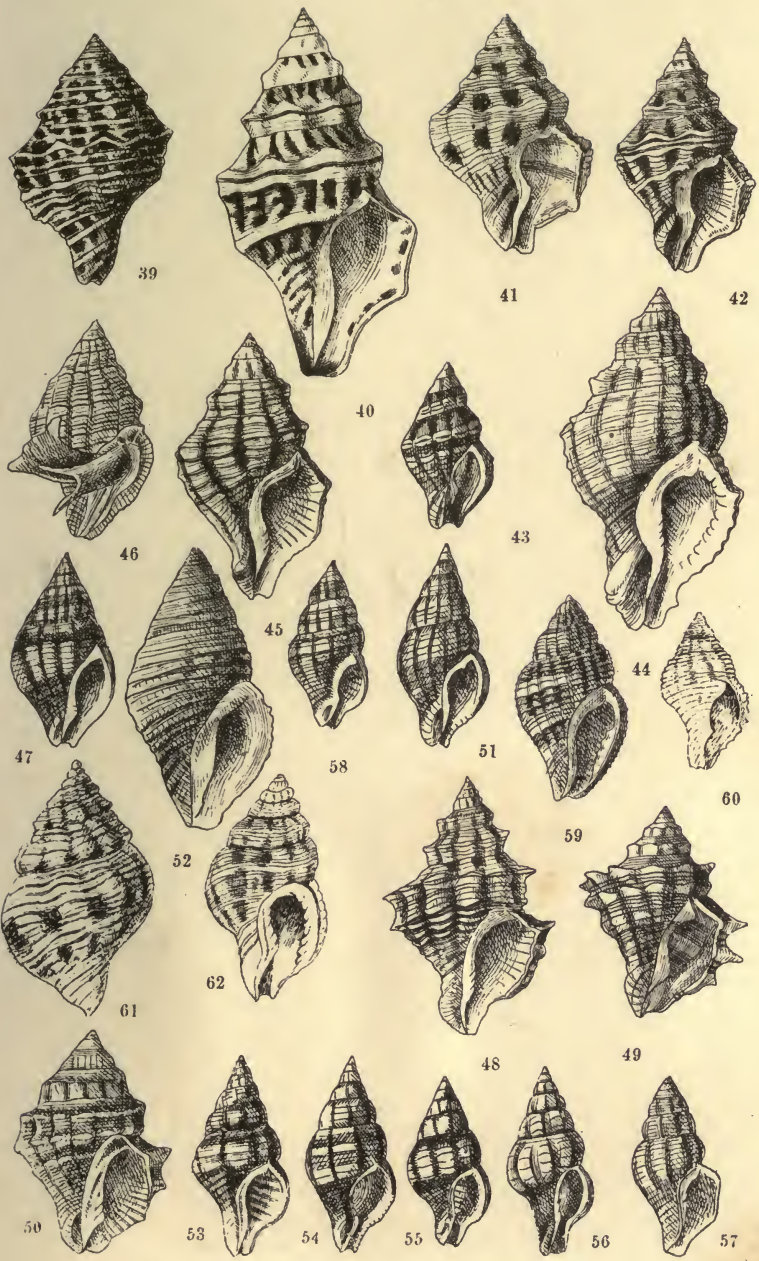
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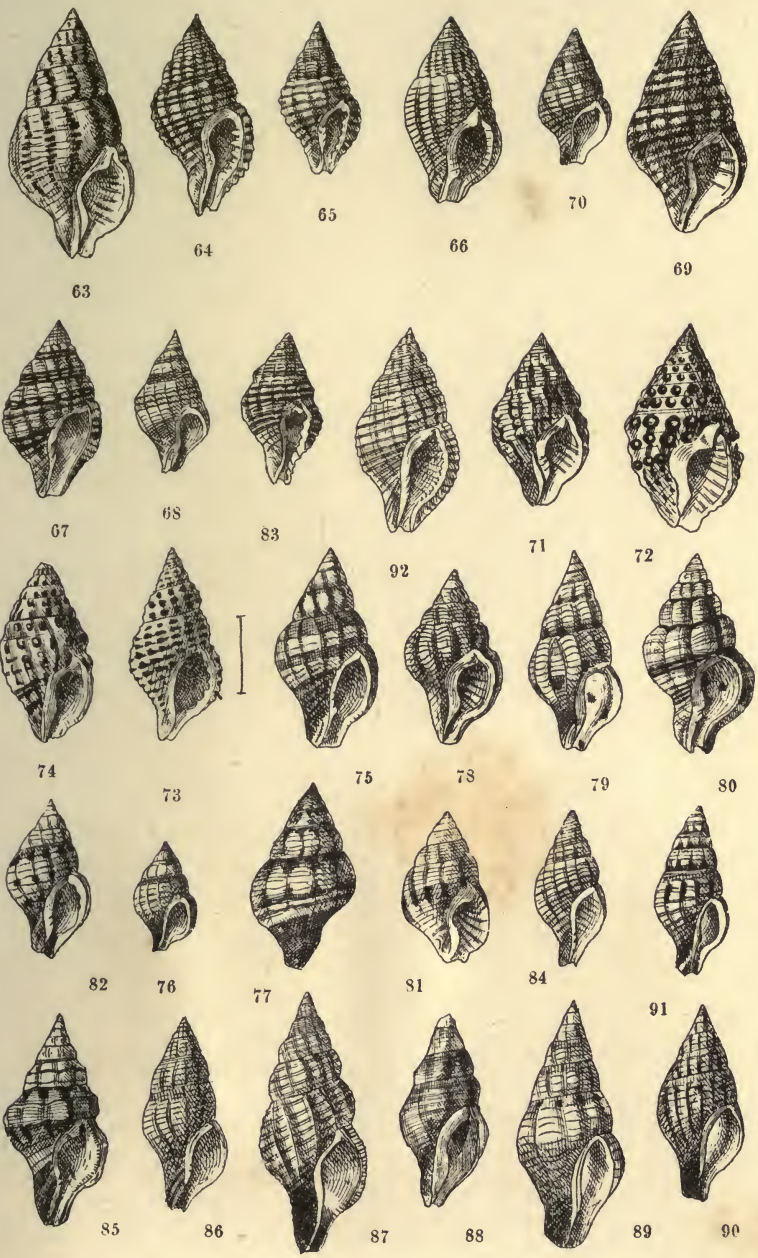
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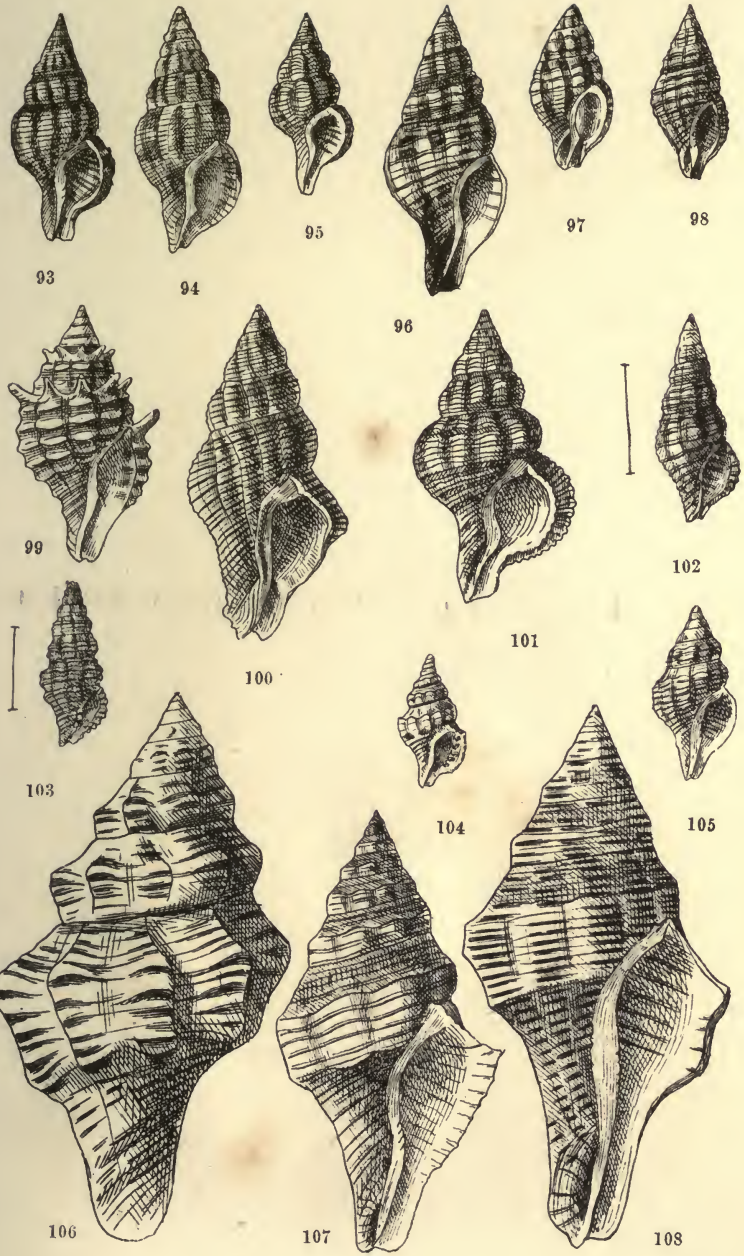
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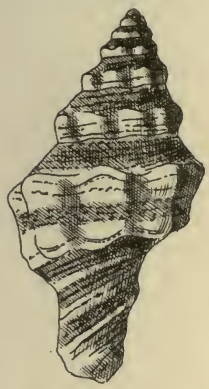

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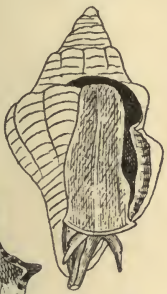

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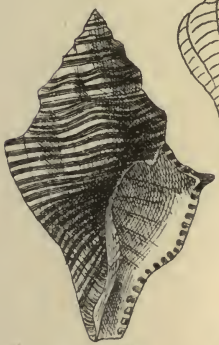

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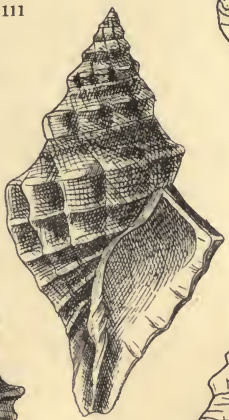

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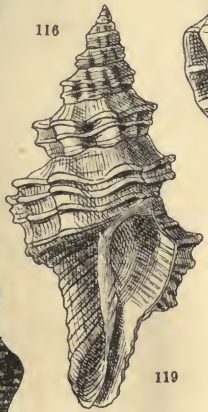

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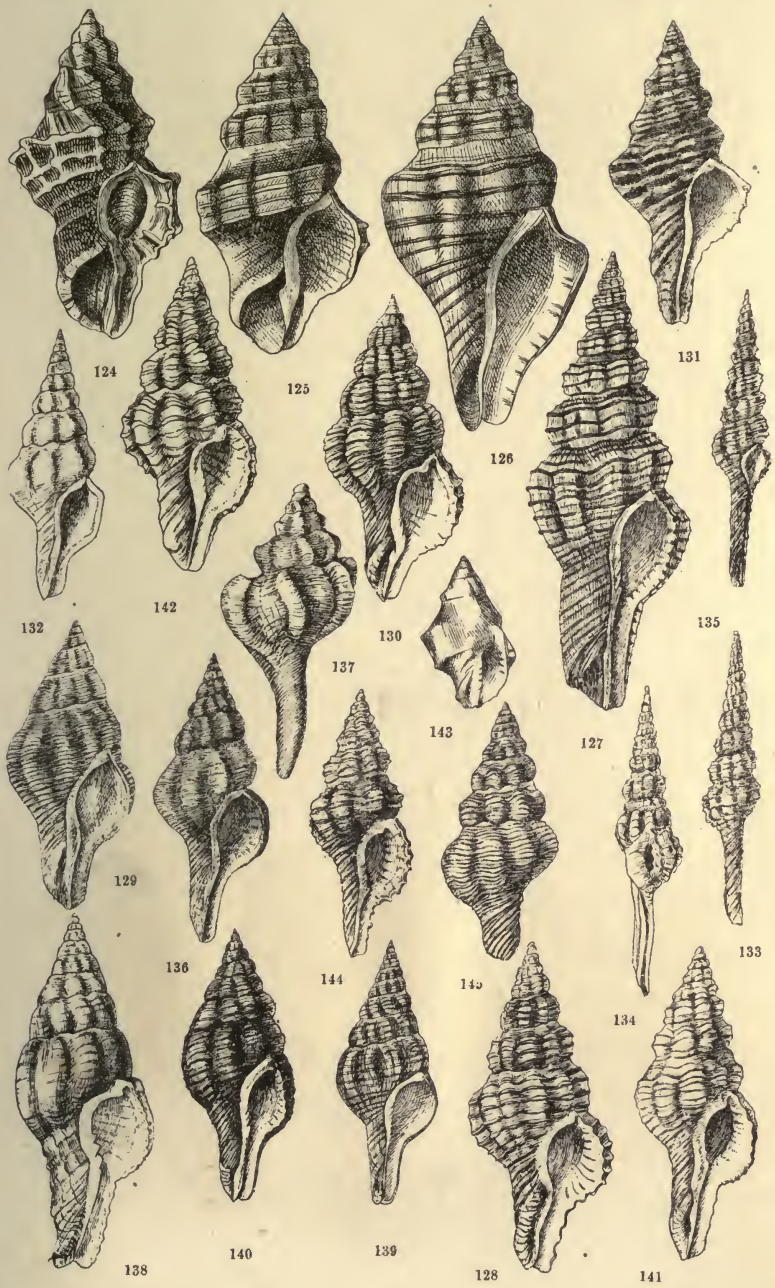
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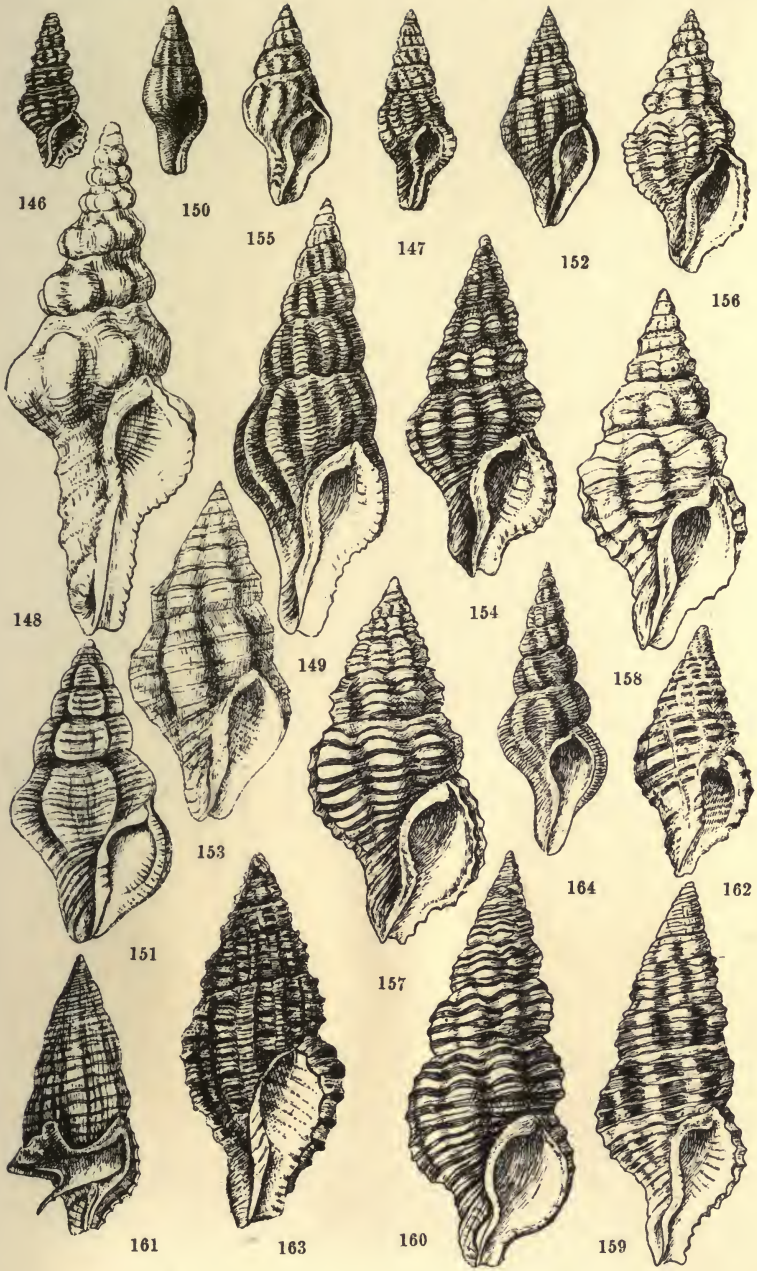
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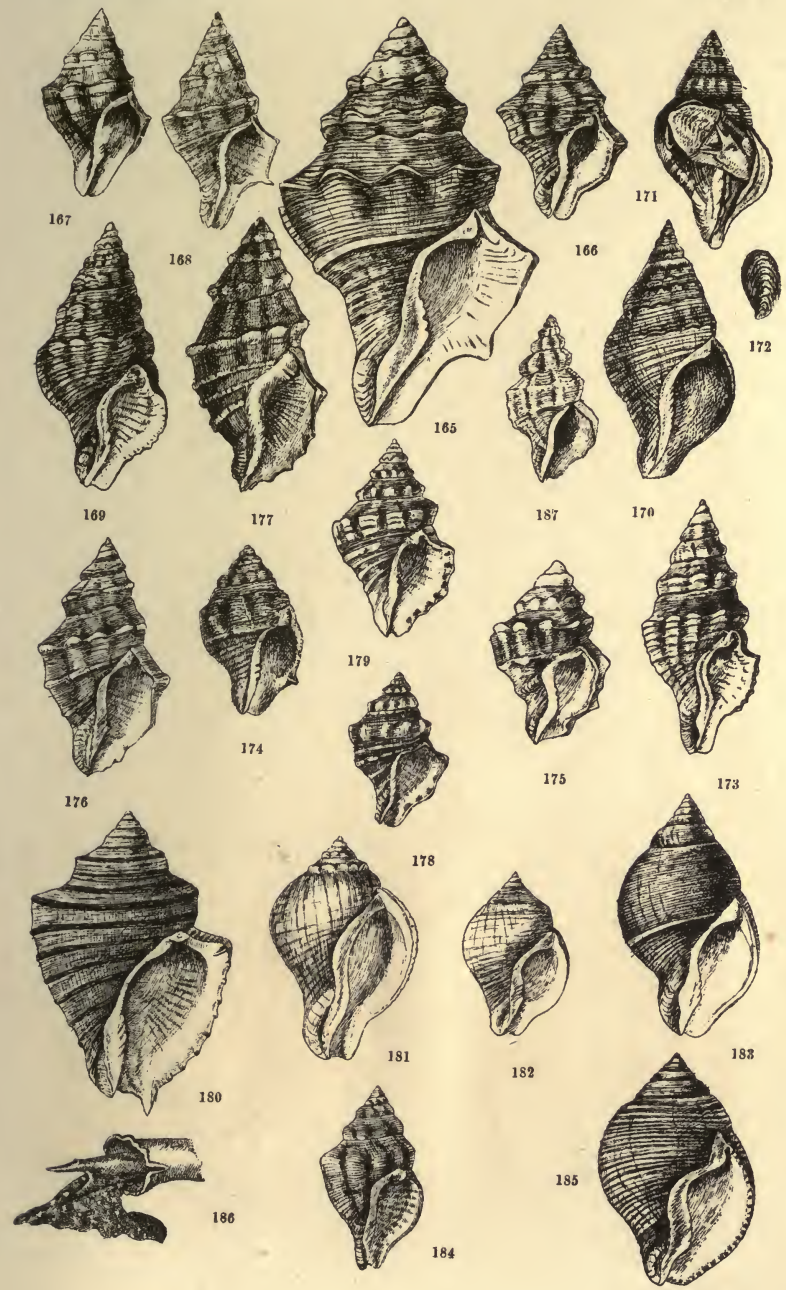
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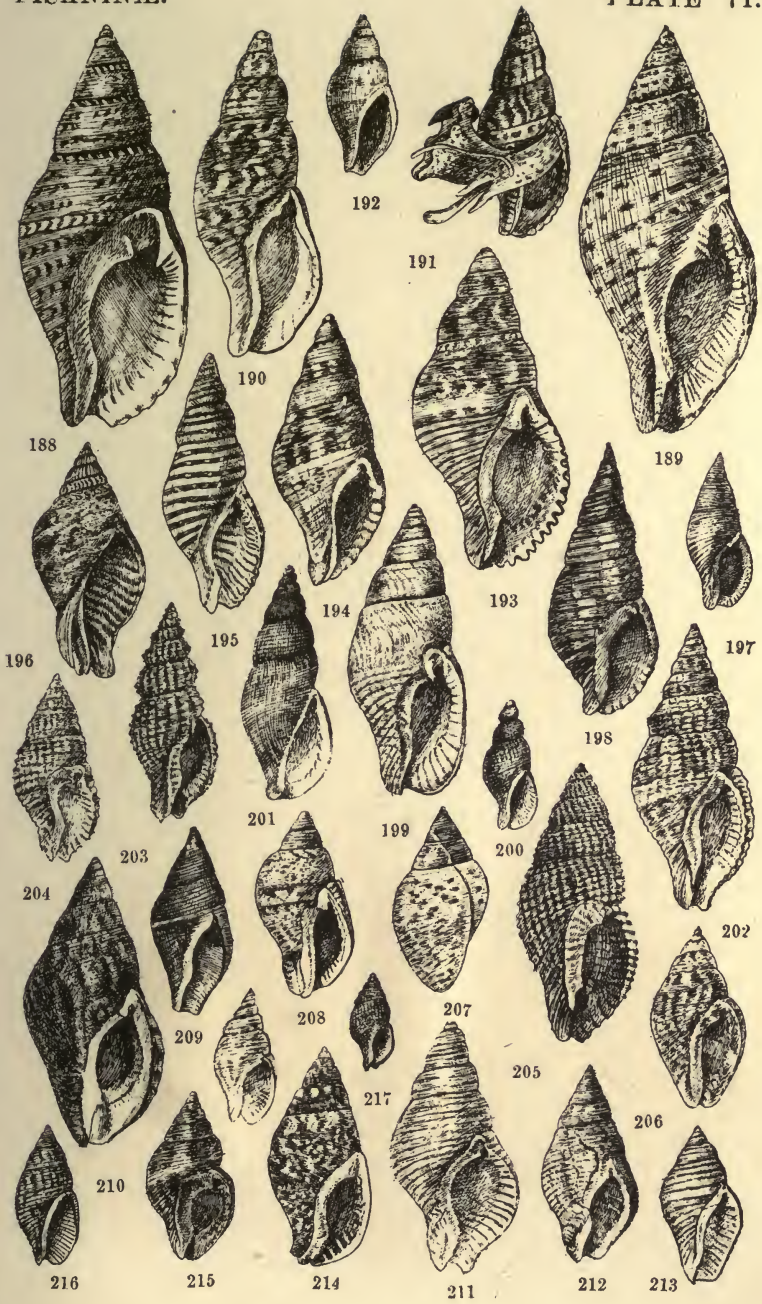
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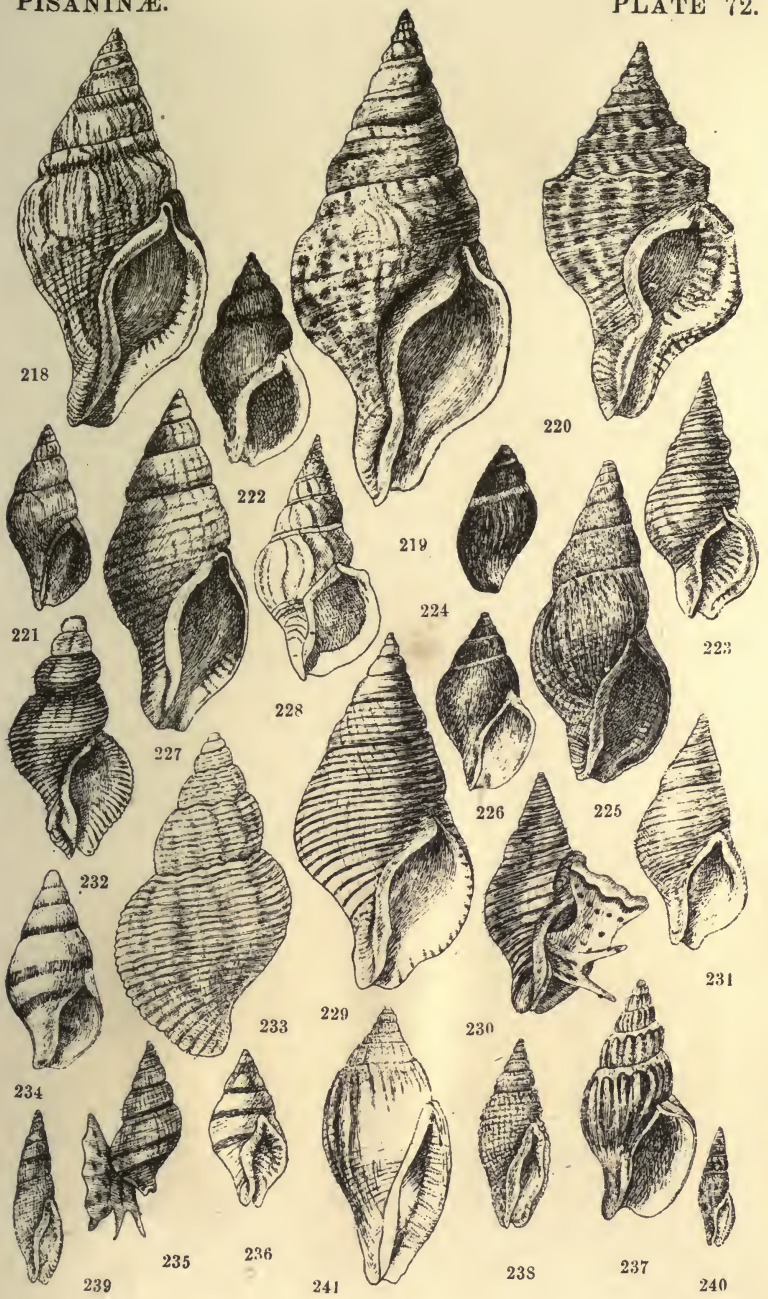
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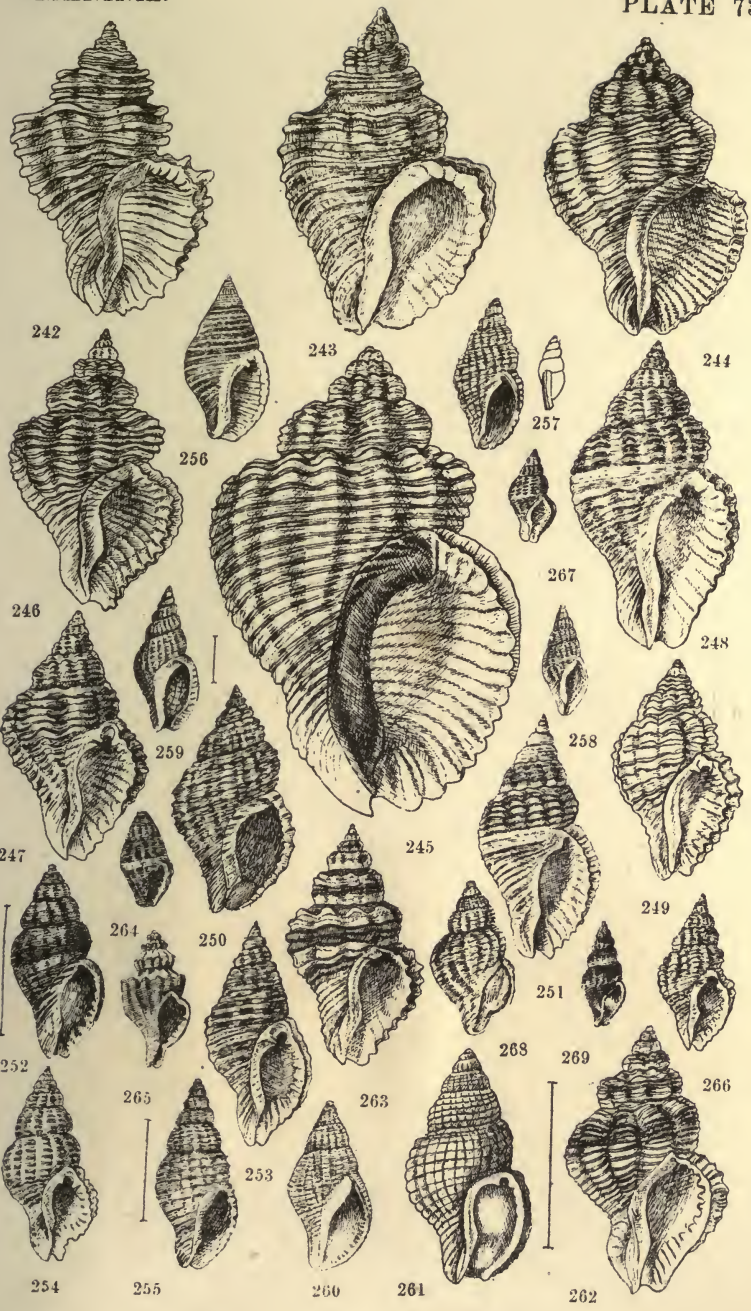
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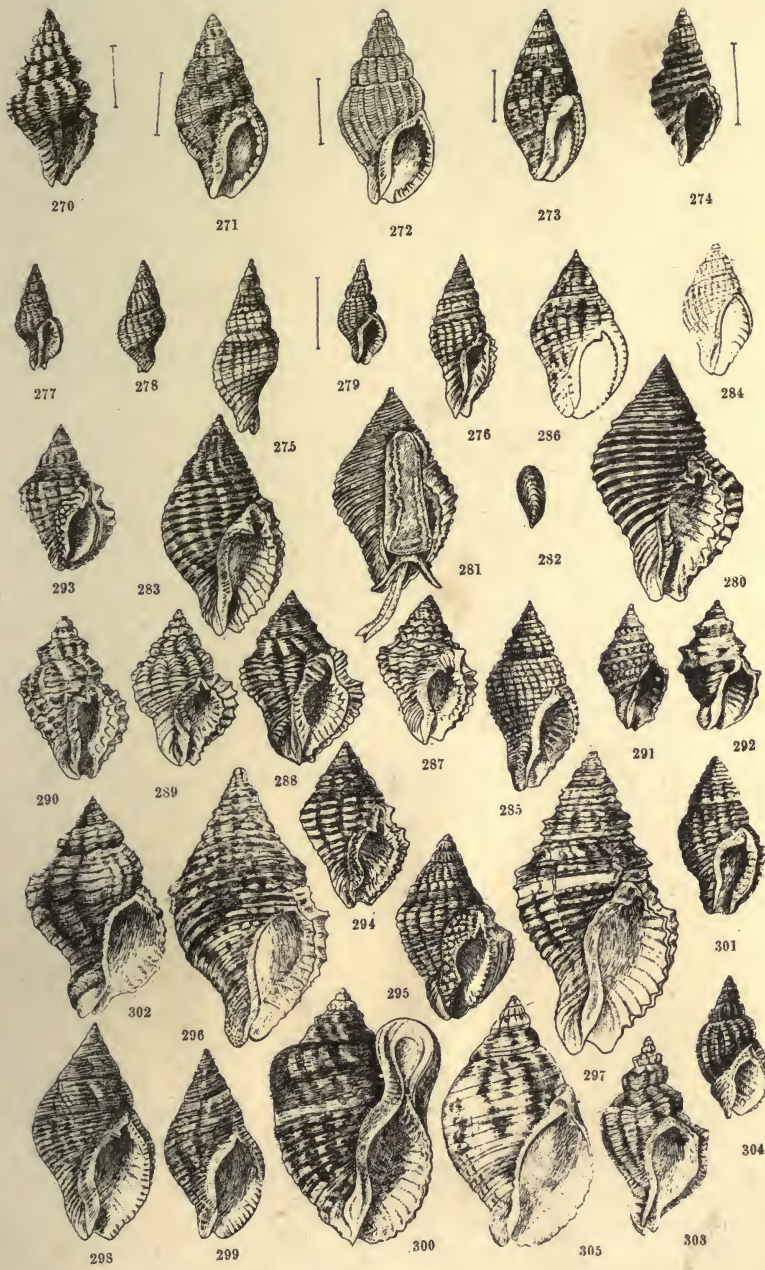
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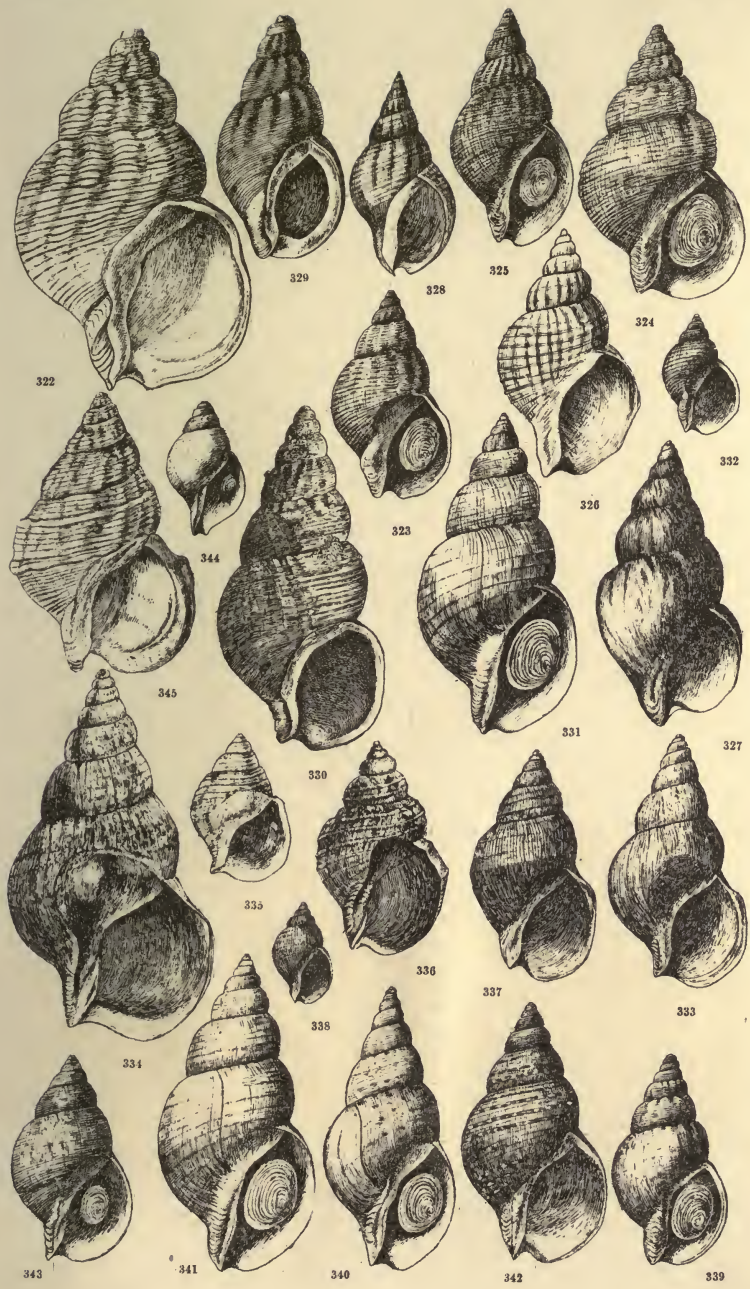
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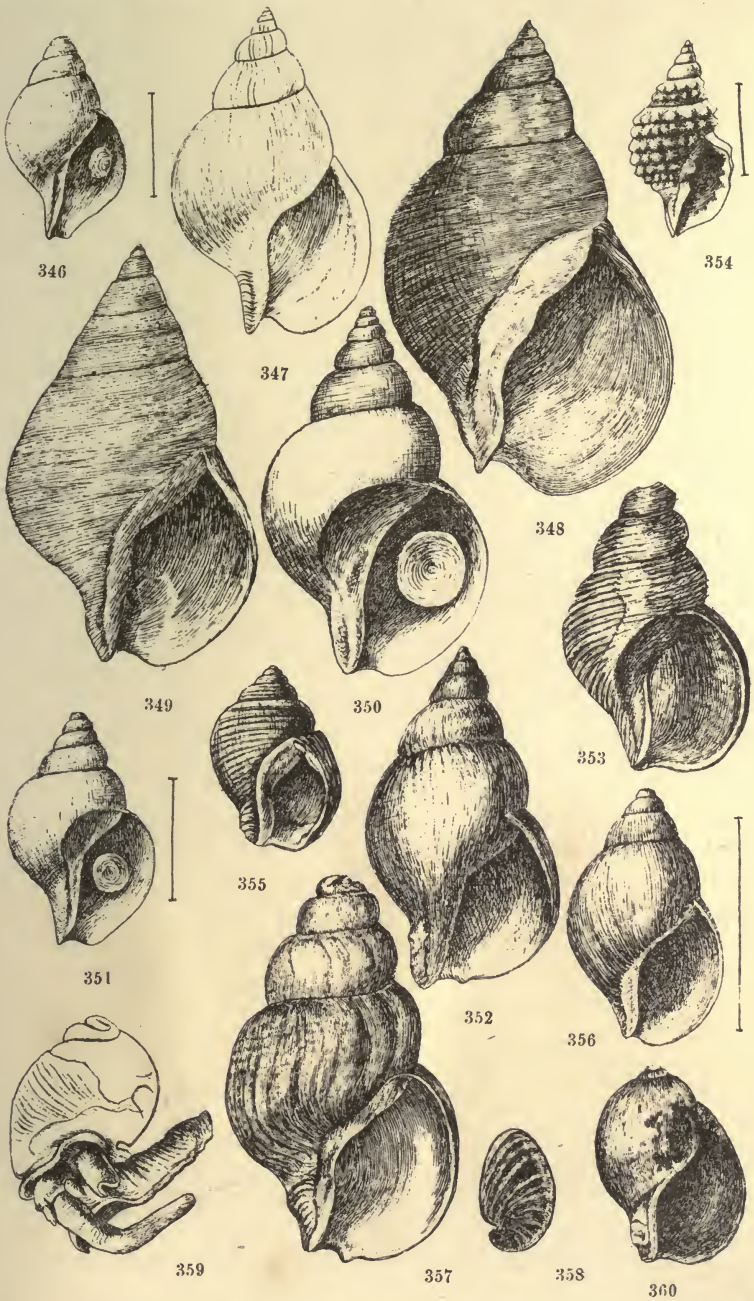
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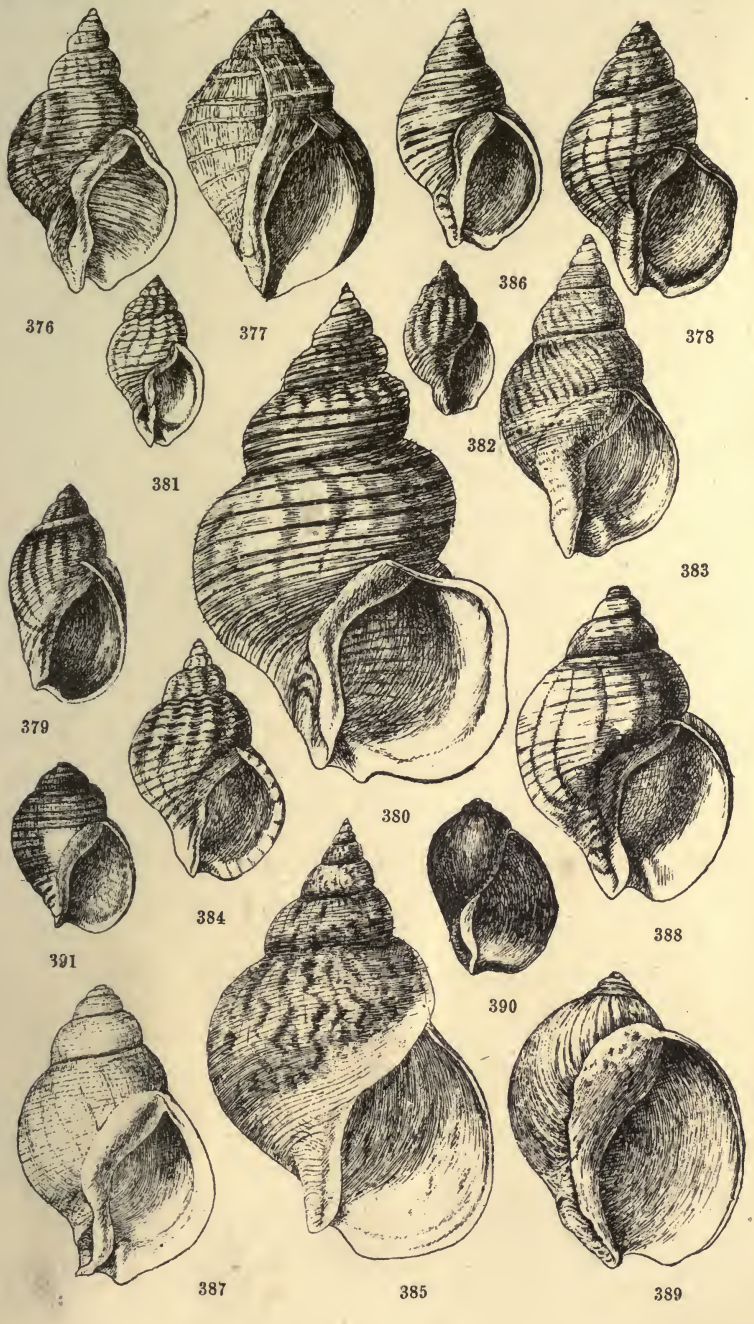
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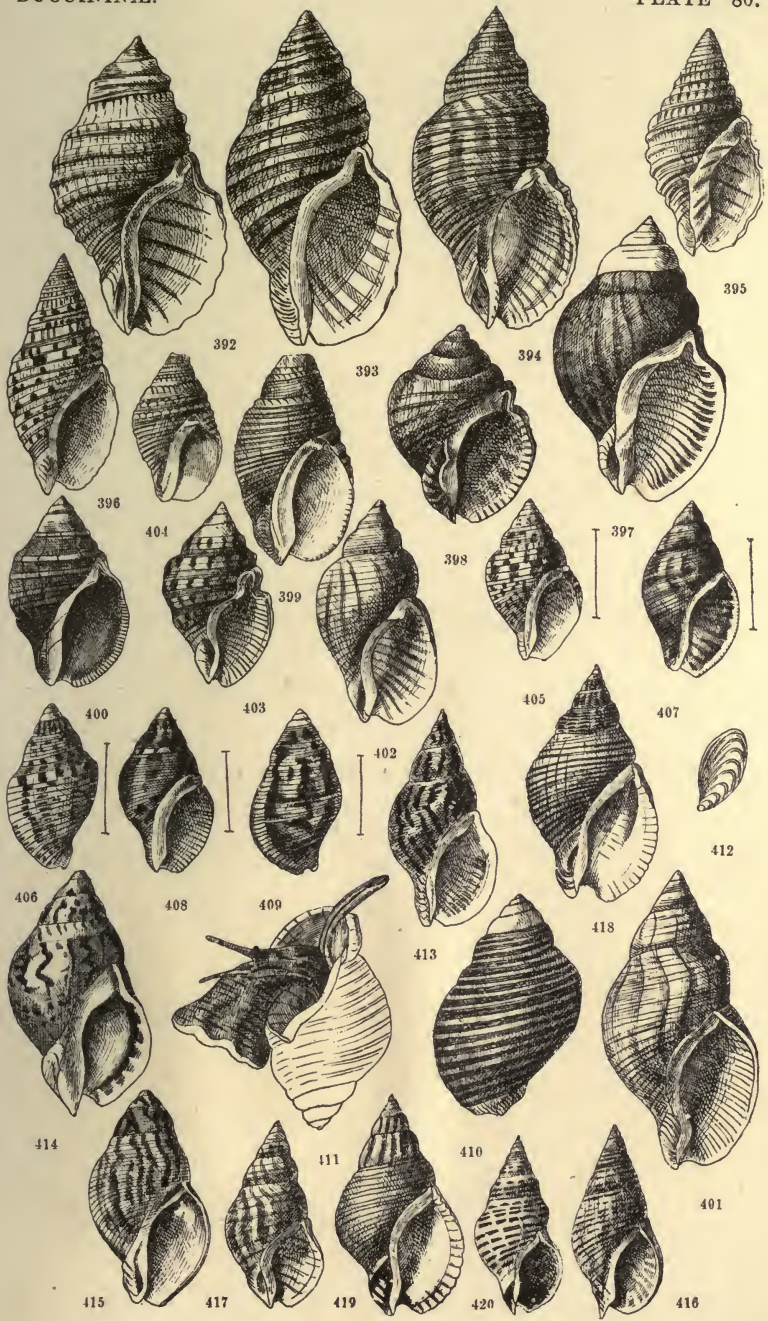
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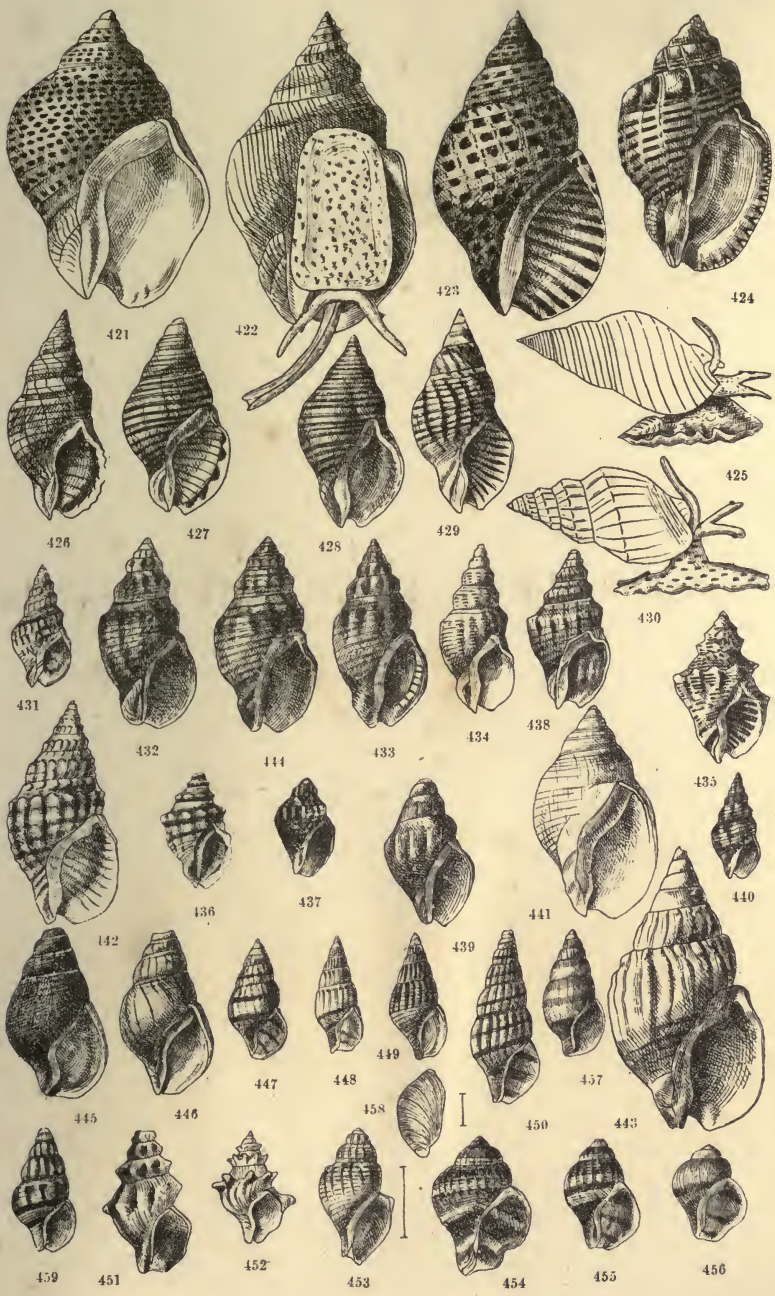
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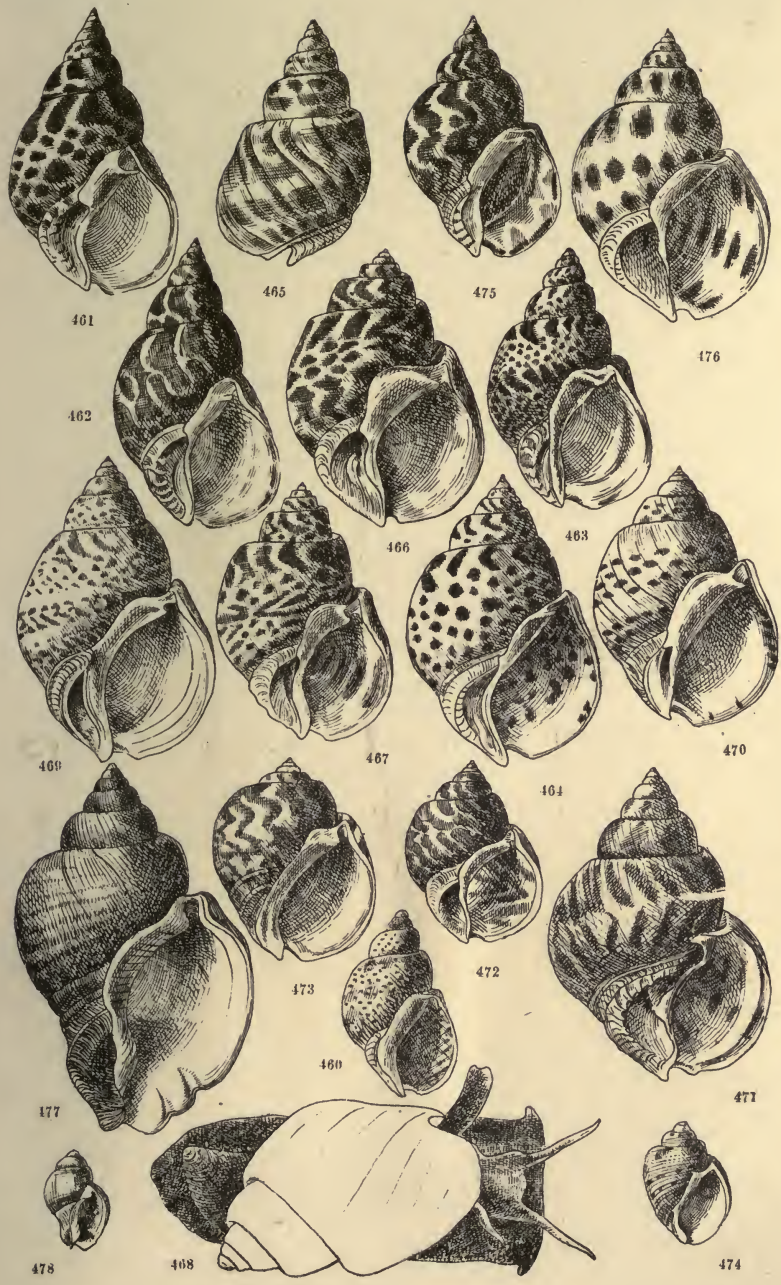
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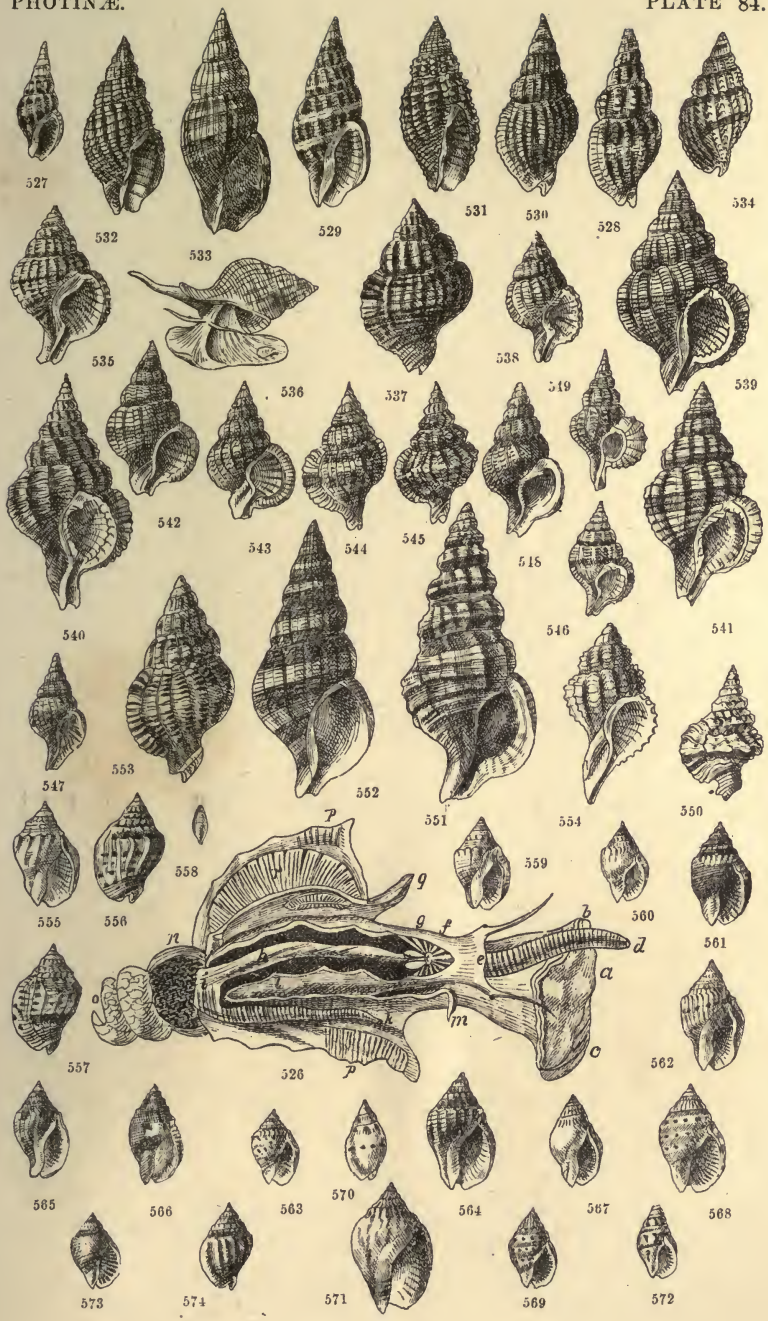
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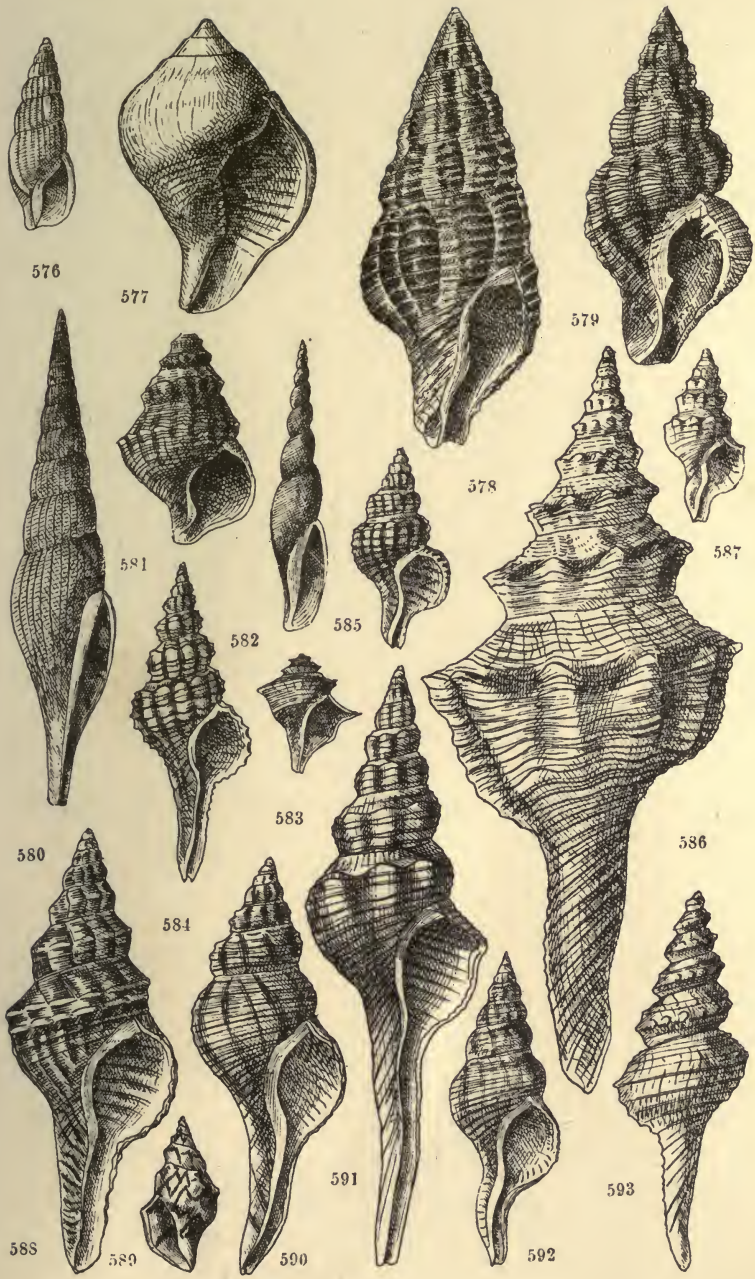
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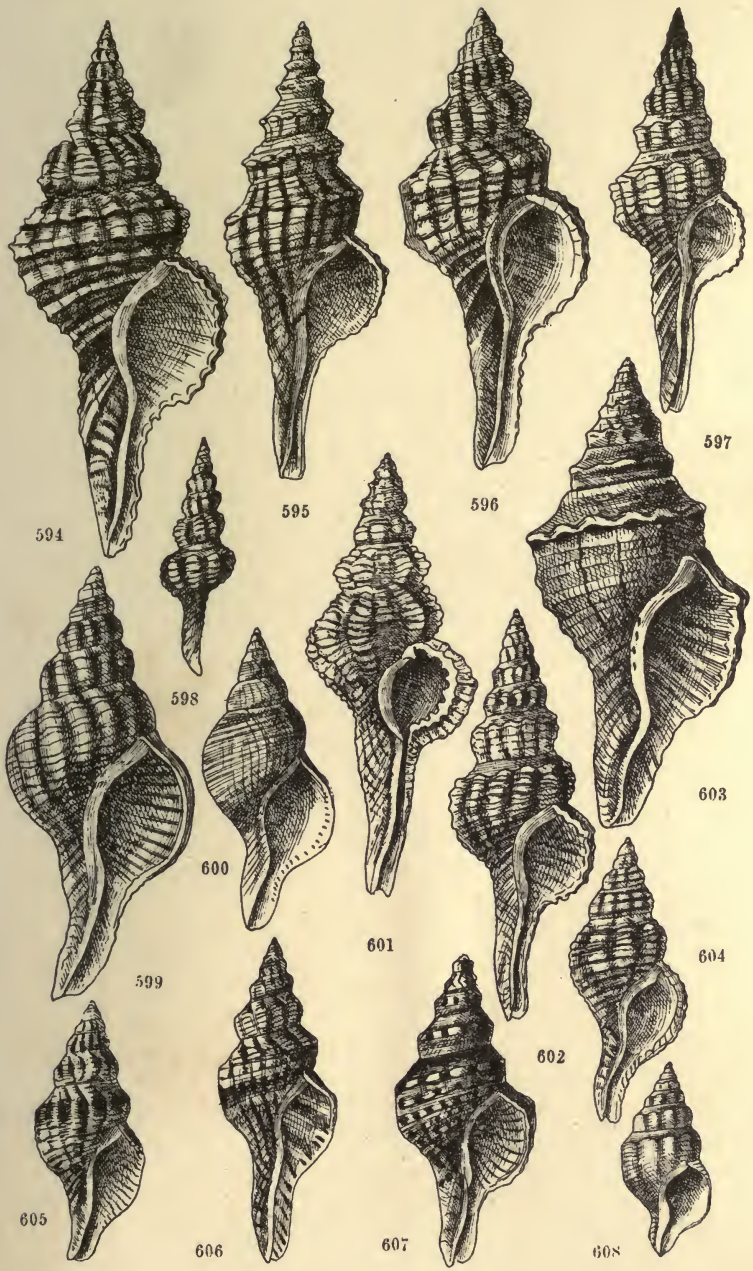
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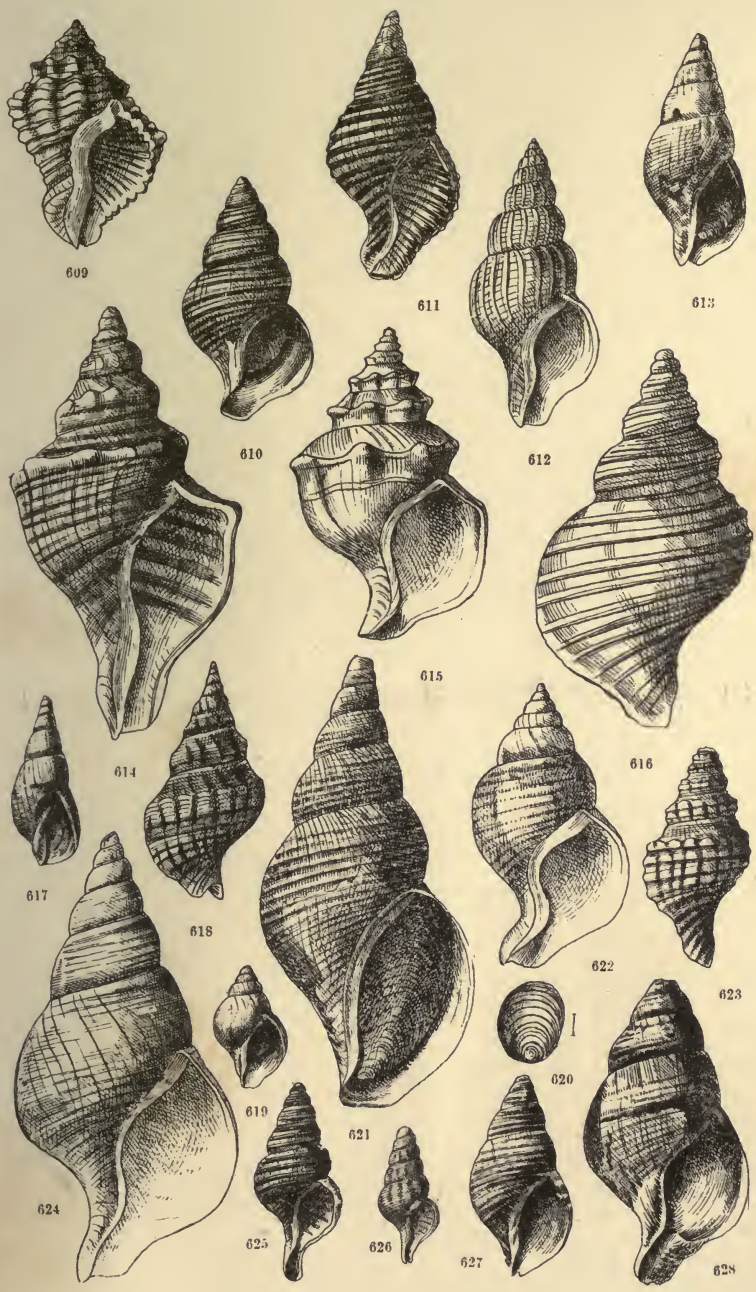
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